

HOLE-TYPE NOZZLES  
WITH RESTRICTED  
SPRAY ORIFICES

Workshop: EP  
02.1992  
0311 En

For some time, hole-type nozzles have been encountered in the field with restricted spray orifices. As a consequence, considerable power losses have been observed in some of the engines concerned. Complaints have likewise been received about black smoke and a high consumption level.

The cause of these restrictions has yet to be precisely determined.

There are indications that such restrictions occur with nozzles which have not been cleaned in an ultrasonic cleaner, but rather using a steel brush, an abrasive cloth or blasting methods. There is also a possibility that effects produced by the combustion process are responsible for the above-mentioned restrictions. Such nozzles are encountered on engines from various manufacturers.

Testing of the nozzle-and-holder assemblies concerned on a nozzle tester does not usually give any grounds for complaint, since the restricted spray orifices are not detected.

Spray-orifice restrictions can only be seen with a magnifier, e.g. 1 987 600 005 (6x magnification). Where necessary, use is to be made of a magnifier with a greater factor.

Characteristic features are rounding of the edge of the spray orifice and - depending on the size of the restriction - a bead-like constriction in the spray orifice.

The edges of the spray orifices are normally sharp (even on used nozzles). Nozzles with restricted spray orifices are always to be scrapped and replaced with new ones.

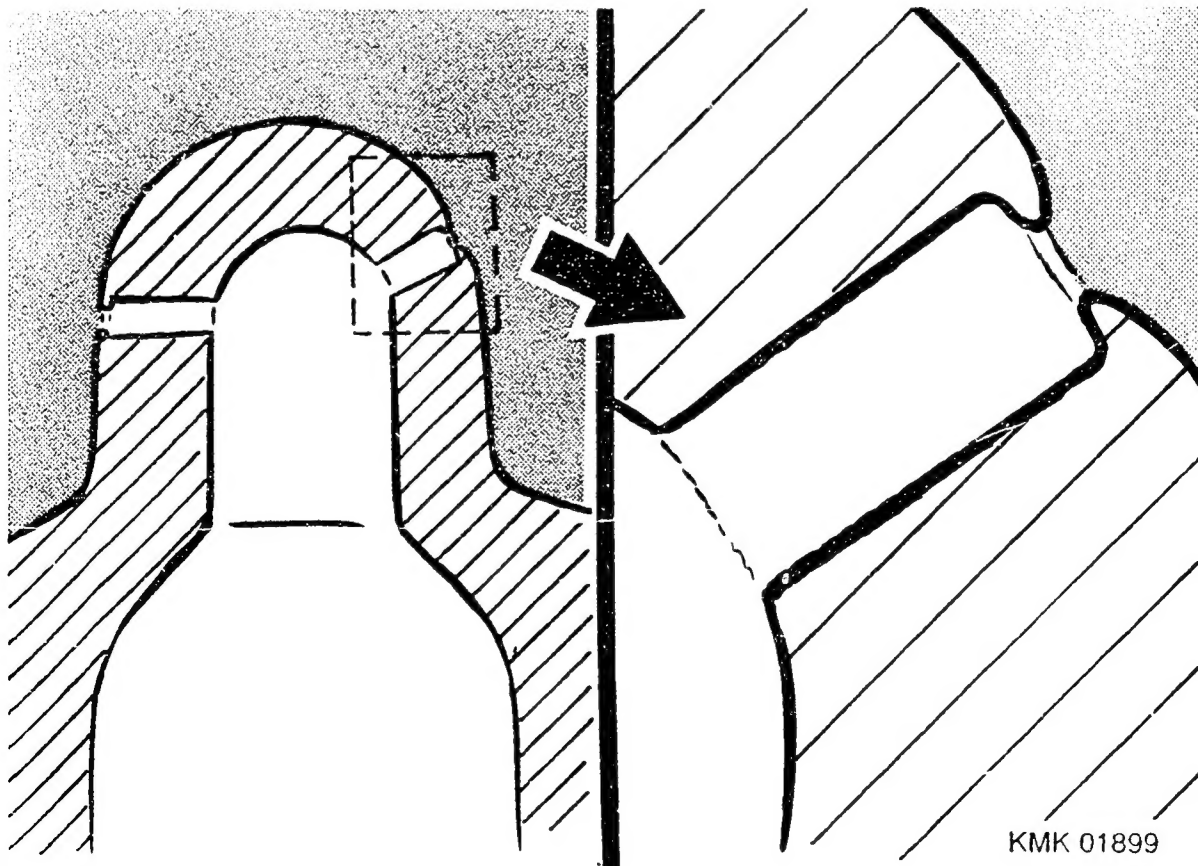
Irrespective of the period of operation, nozzles of this type are not to be replaced under warranty, since the nozzles concerned are not products which feature manufacturing defects.

Testing of the injection-pump assemblies of these engines does not usually lead to a complaint about the injection-pump assembly. For this reason, when the symptoms described initially are encountered, the nozzle-and-holder assembly is always to be examined first.

A check as to incorrect setting of the injection-pump assembly is only to be made if the nozzle-and-holder assembly is ok.

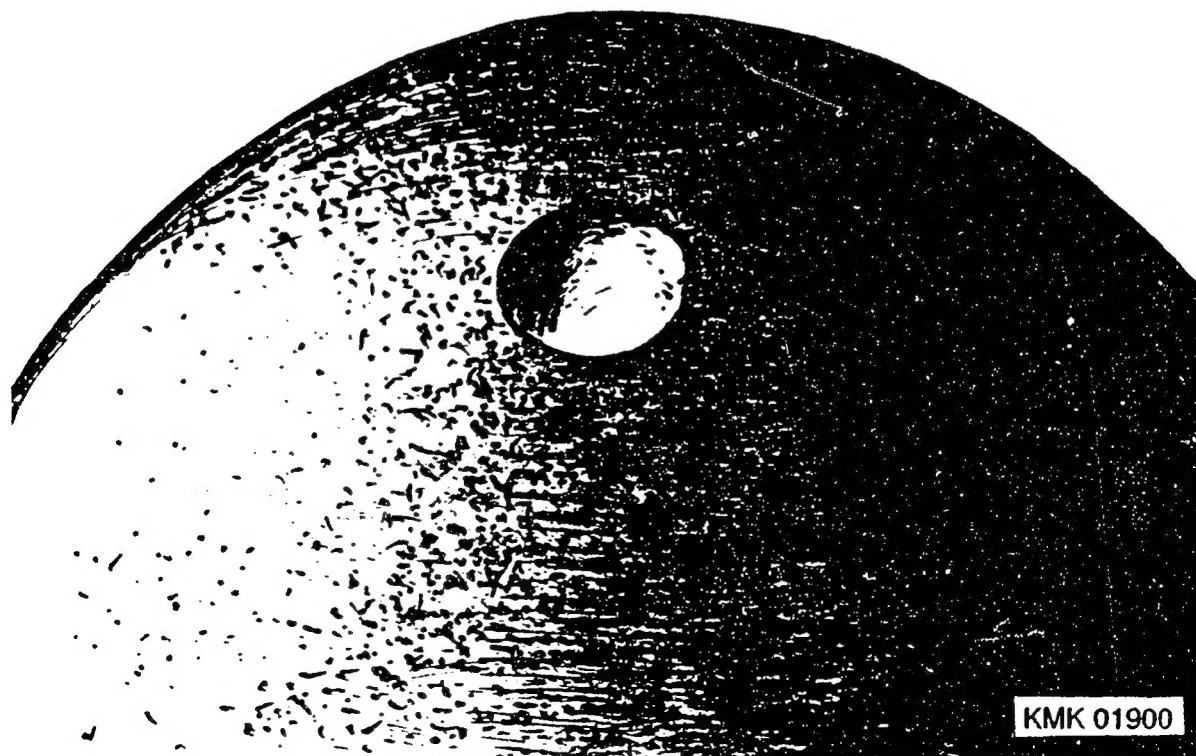
Presented in the following are several illustrative examples of spray orifice restrictions:

Enlargement of restricted spray orifice.



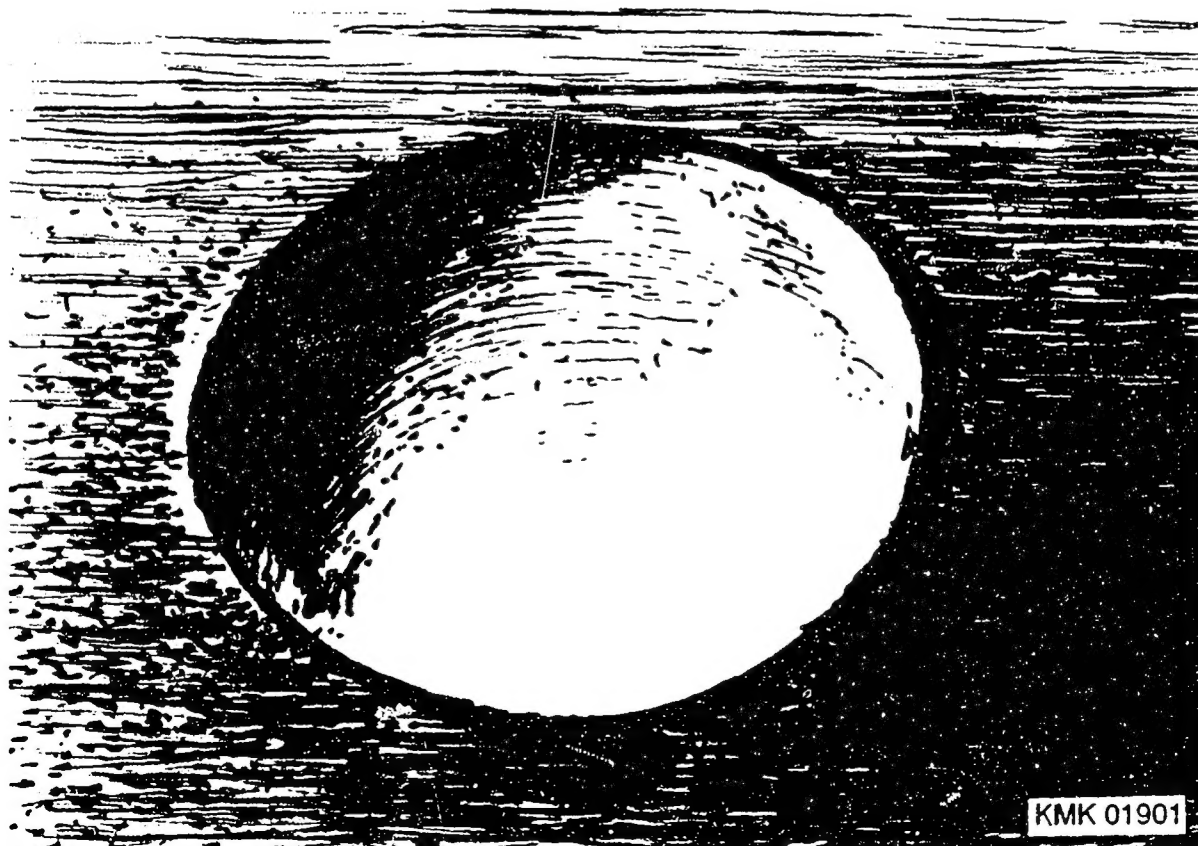
KMK 01899

Curved end of a hole-type nozzle with  
sharp spray orifice.



KMK 01900

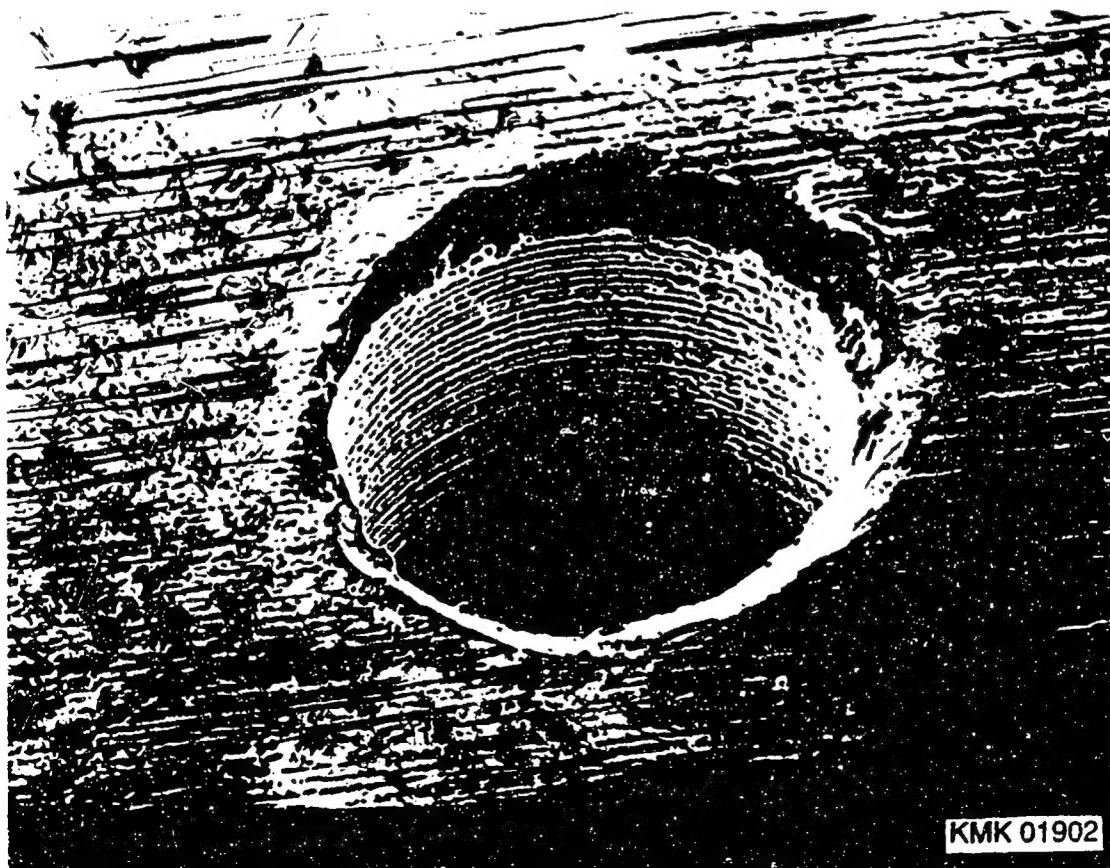
Enlargement of spray orifice of new or worn nozzle with sharp spray orifice edge (spray orifice ok).



KMK 01901

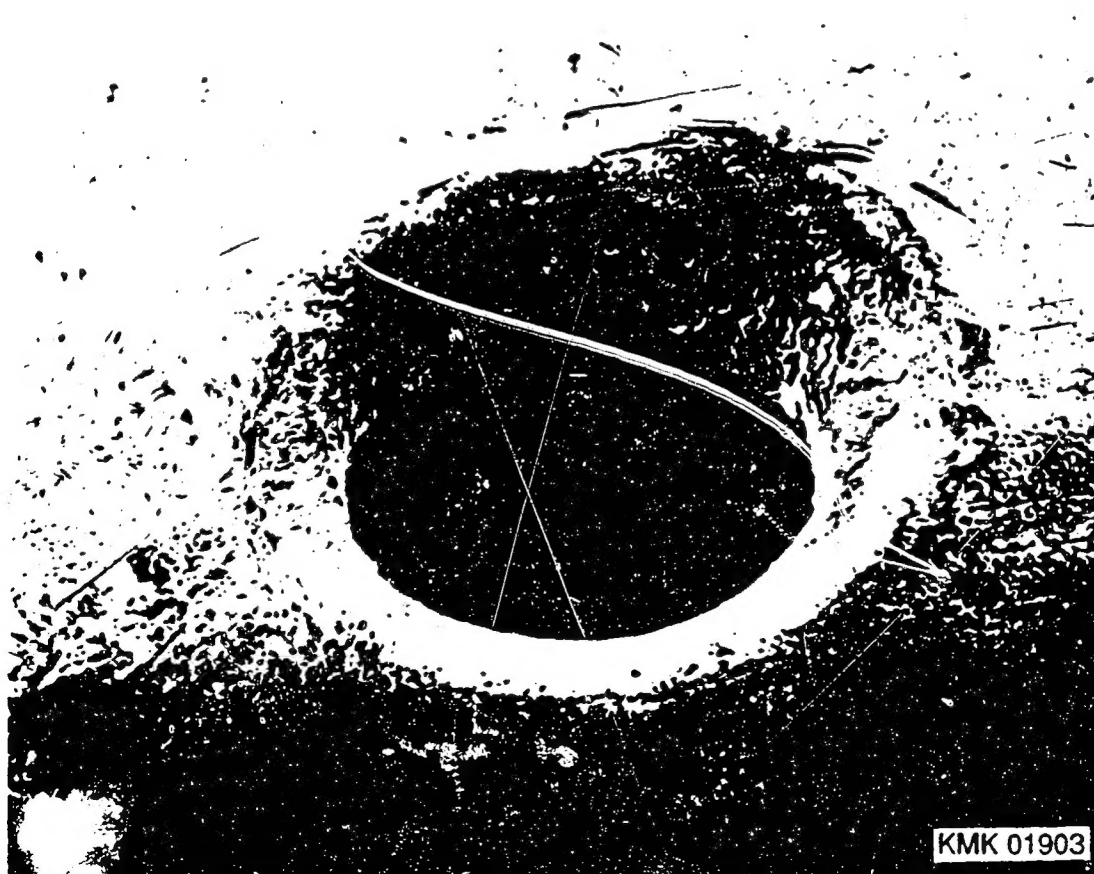
Restricted spray orifice edge.  
Reduction in flow approx. 5 %.

The spray orifice edge is no longer sharp, but rather clearly rounded.



Restricted spray orifice edge.  
Reduction in flow approx. 20 %.

As a result of the restriction of the  
spray orifice edge, the fine marks on  
the wall of the spray orifice produced  
during machining can no longer be seen.



KMK 01903

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ROUGH IDLE  
COMPLAINTS ON  
1983-1984

VOLVO DIESEL VEHICLES

Motor vehicle: FZD  
and workshop: EP  
04.1992  
0312 En

Some Volvo Diesel vehicles with VE distributor pumps may experience a rough idle condition. In the event that this condition exists, the governor spring (item 68) and the fulcrum lever (item 95) must be replaced with the new, updated versions

Injection pumps manufactured as of January 1984 production (date code 441) will be manufactured with the new version parts. The parts list will be updated to reflect the new governor spring and fulcrum lever. The following is a list of injection pumps that are effected by this modification. Also listed are the new and old governor spring and fulcrum lever numbers.

Pumps	VE...L 116	0 460 406 018
	VE...L 116-1	0 460 406 019
	VE...L 114	0 460 406 029
	VE...L 144-1	0 460 406 030

old gov. spring	1 463 161 501
new gov. spring	1 463 161 644
old fulcrum lever	1 461 902 573
new fulcrum lever	1 461 902 757

Pumps	VE...L 135	0 460 406 026
	VE...L 135-1	0 460 406 028

old gov. spring	1 463 161 546
new gov. spring	1 463 161 645
old fulcrum lever	1 461 902 573
new fulcrum lever	1 461 902 757

These modifications will not be covered under warranty. Customer should be charged for updating of pump. The letter M should be stamped after the ten digit number to signify modified governor.

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REPAIR AND  
CALIBRATION OF  
PEUGEOT VE PUMPS

Workshop: EP  
04.1992  
0313 En

Due to EPA regulations the VE pumps used on the 1980-1984 Peugeot diesels are equipped with an EGR (Exhaust Gas Recirculation) control device. This device is preset at the factory and can not be adjusted in the field.

To effectively reduce NOx emissions without effecting engine performance the rate of EGR is regulated. The position of the pump control lever, in conjunction with the EGR control device is used to regulate the percentage of EGR. Master test equipment, which is calibrated on the engine, is used to accurately calibrate the EGR control device on Bosch remanufactured and production injection pumps.

This equipment is not available to the aftermarket. The following Peugeot VE injection pumps, therefore cannot be calibrated in the field:

VE 4/ 9F 2250 R 50	0 460 494 041
VE 4/10F 2075 R 67	0 460 404 012
VE 4/10F 2075 R 67-1	0 460 404 020
VE 4/10F 2075 R 112	0 460 404 027
VE 4/10F 2075 R 112-1	0 460 404 028

Should you have an inquiry for repair and/or calibration of one of above Peugeot VE pumps, which requires calibration with Peugeot master test equipment, you should direct the vehicle owner back through the Peugeot Dealer Network.

Please note:

This bulletin does not affect the 1985-1986 model year vehicles.

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INJECTION PUMP  
COMBINATION 9 400 230 684

Workshop: EP  
04.1992  
0315 En

PES 6A 100D 410 XA 2123  
RSV 450-1100 A1BXA 2123/1  
John Deere No. RE 19957,  
Service 19956 FP/KE 22 AD 306

Approximately 138 pieces of this combination were converted by John Deere for use in dual power motor grader models 770B-H and 772B-H with engine 6466 AT-12.

Should one of these injection pump assemblies require service, please proceed as follows:

1. Parts lists and test specifications use the information for combination 9 400 230 066 as base with the subsequent changes:

## Parts

Injection pump: No change

Governor: External control lever  
AR-89577-1 422 013 081  
Shut off lever  
AR-63565-1 421 910 069  
Torque capsule  
AR-86528-1 420 506 218

Aneroid: Aneroid spring  
R-76413 -2 424 617 018

Feed pump: Feed pump assembly  
RE 10605-9 440 080 008  
w/elbow  
AR 104674 RE 20162

## Test values

Min. of 10 PSI to aneroid

A) Rated speed 1100 rpm  
113.5 +/- 3 mm<sup>3</sup>/stroke

- 1) Adjust full load at 1100 rpm to nominal fuel delivery with full load screw
- 2) Back out full load screw 0,5 mm rack position
- 3) Increase full load with torque capsule to nominal fuel delivery



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CALIBRATION  
OF VE PUMPS

Workshop: EP  
04.1992  
0316 En

This VE Pump differs from more common VE Pumps in that it has a 20 mm taper drive shaft which requires drive coupling 1 416 430 010 to test the pump.

This pump also features locked timing.

To prevent damage to the pump, the lock timing bolt spacer plate(1 461 016 308) must be installed during pump test and/or calibration. Tightening torque of locking bolt at this time: 10..15 Nm.

Calibrate the pump as any normal VE pump (with pre-stroke) using the following tools:

1 688 130 045	Pre-stroke measuring device
1 683 458 019	Pre-stroke measuring device extension
1 687 233 012	Dial indicator
1 688 901 016	Test nozzle holder (0,5 mm orifice plate)
1 680 750 017	Test lines (6 x 2 x 840)

When calibration is complete, reinstall pre-stroke measuring device, set lock timing lift per specifications, remove spacer plate and engage the timing lock.

Torque locking bolt to 30...35 Nm. Remove pre-stroke measuring device and reinstall vent screw using a new sealing gasket. Tightening torque on vent screw is 8...10 Nm. Install anti-tampering devices (lead seals) on both full load adjustment and high speed stop screw. Be sure to attach timing lock spacer plate to pump for use when pump is reinstalled on engine.

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ENGINE RUN-ON  
CONDITION WITH  
CASE/CUMMINS  
VE PUMPS  
0 460 426 047 / 055

Motor vehicle: FZD  
and workshop: EP  
04.1992  
0317 En

On some Case/cummins engine applications an engine run-on condition may exist during shut-off at engine RPMs above low idle while activating the shut-off solenoid.

To correct this condition, the housing pressure must be reduced while retaining a similar advance curve. Therefore, the advance piston spring and advance piston shims must be changed. Should you receive a pump with this type of complaint the pump must be updated as follows:

1. Replace advance spring 1 464 619 302 (yellow) with advance spring 1 464 619 311 (bronze).

2. Replace the timing shims using 0.3 mm plunger return shims (position 822 on part list). Timing piston shim pack should equal a total of 0.6 mm. Place one shim to each side of advance spring. Shims are available in shim selection group 1 460 100 902.

Once modifications are made set housing pressure and advance curve to following values:

RPM	Housing pressure	Advance travel
500	1.8...2.4 bar	0.4...1.2 mm
750 *	2.9...3.5 bar	3.3...3.7 mm
900	3.5...4.1 bar	4.6...5.4 mm

\* set point

3. Check for fuel shut-off: place control lever against high speed stop screw, run pump at rated speed, then deactivate the electric shut-off solenoid. No fuel should be delivered over the entire speed range from rated speed to 0 rpm.

After calibration is completed the letter "H" should be stamped after the ten digit number. The "H" will signify modified housing pressure.

Should you receive a pump with the letter "H" stamped on the housing the above specification must be used during calibration.

Replacement of the advance spring and recalibration is covered under normal warranty.

When filing for warranty reference should be made to this service bulletin.

You will be reimbursed for the replacement parts and 0.8 hours for labor.

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CUMMINS  
VE PUMP  
MODIFICATION

Motor vehicle: FZD  
and workshop: EP  
04.1992  
0318 En

On some cummins engine applications with the VE type distributor pump, a low idle surge condition may have existed.

To correct the surge, Cummins Engine Company instructed their service personnel to install bypass type delivery valves.

With the installation of the bypass valves, calibration to the test specification is no longer possible, as none exist for this modification.

This modification is identified by the letter "B" stamped in front of the VE letter designation. Should you receive one of these pumps for calibration and/or repair, instruct your customer to return the pump to Cummins, for a replacement pump.

To properly correct the surge condition a new generation Cummins VE pump has been developed.

The following is a listing of the first generation (Phase I) and its replacement, the second generation (Phase II).

Phase I	Phase II
0 460 424 006	0 460 424 024
0 460 424 007	0 460 424 022
0 460 424 008	0 460 424 023
0 460 424 015	0 460 424 026
0 460 424 016	0 460 424 027
0 460 424 019	0 460 424 028
0 460 426 035	0 460 426 066
0 460 426 038	0 460 426 077
0 460 426 046	0 460 426 078
0 460 426 049	0 460 426 069
0 460 426 043	0 460 426 071
0 460 426 056	0 460 426 073
0 460 426 052	0 460 426 081
0 460 426 051	0 460 426 082

Since the replacement of the pump is not covered under warranty, the customer should be charged.

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LOW SPEED	Motor vehicle: FZD
INSTABILITY ON	and workshop: EP
CUMMINS C-SERIES ENGINE	04.1992
WITH A/RSV INJECTION	0319 En
PUMP COMBINATION	

Low speed instability may be encountered on certain Cummins C-series engines.

This is especially evident on engine applications for cranes, forklifts and others where a high hydraulic load exists at low speeds. Should you receive any of the following injection pump and governor combinations with a low speed instability complaint that could not be corrected on the engine, proceed to convert the governor of the respective combination according to the schedule below:

## Potential for Low Speed Instability

Bosch 10 digit No.	CDC Part No.
9 400 230 090	390 6535
9 400 230 094	390 6538
9 400 230 073	390 6541
9 400 230 088	390 6547
9 400 230 091	390 6545
9 400 230 100	390 6542
9 400 230 101	390 7180
9 400 230 093	390 9986

## Improved Low Speed Stability

Bosch 10 digit No.	CDC Part No.	Torque Capsule
9 400 230 099	390 6535	
9 400 230 099	390 6538	
9 400 230 097	390 6541	
9 400 230 097	390 6547	
9 400 230 089	390 6545	1 420 506 553
9 400 230 089	390 6542	
9 400 230 089	390 7180	9 420 275 002
9 400 230 102	390 9986	9 420 275 002

The parts listed below must be replaced on all governors:

- |                              |               |
|------------------------------|---------------|
| 1. Governor tensioning lever | 9 421 270 194 |
| 2. Governor main spring      | 2 424 650 008 |
| 3. Governor flyweight        | 9 420 270 191 |

Adjustment of injection pump and governor is to be done according to the specifications of the new Bosch 10 digit part number and its respective Cummins part number.

Following the conversion, make sure that the injection pump/governor nameplates reflect the new Bosch/Cummins part numbers as indicated in the two columns under "Improved Low Speed Stability" of the above schedule.

This conversion is to be performed at the customer's request and his expense. Please advise the customer of this prior to performing this conversion.

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MACK P-SIZE PUMPS  
WITH CELERON  
DRIVE COUPLING

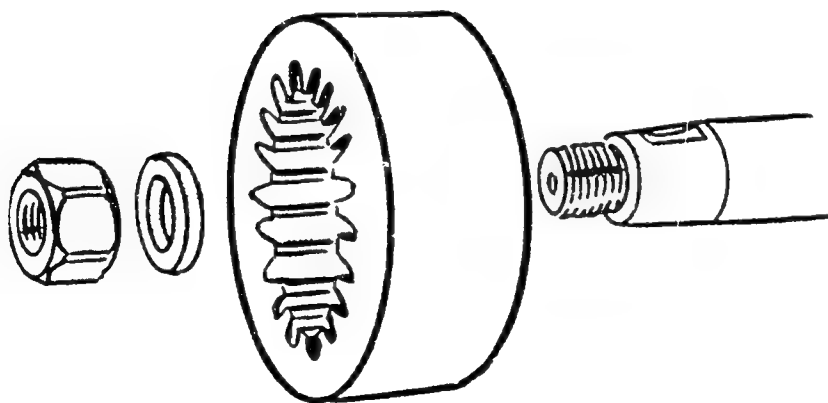
Motor vehicle: FZD  
and workshop: EP  
04.1992  
0320 En

Robert Bosch P-size fuel injection  
pumps used by Mack Trucks currently  
employ a Celeron drive coupling.



The Celeron drive coupling, flat washer and hex nut are Mack parts and are available through a Mack dealer. The puller is available under part number 9 682 238 908.

When removing or installing the Celeron drive coupling use coupling wrench 9 683 238 912 to avoid damage to the coupling.



KMK 02022

Before installing the Celeron drive coupling, thoroughly degrease all tapered surfaces. When installing the Celeron drive coupling use Loctite 262 on the camshaft threads and torque the hex nut to 176...183 Nm (130...135 ft lbs).

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## BYPASS DELIVERY VALVE

Workshop: EP

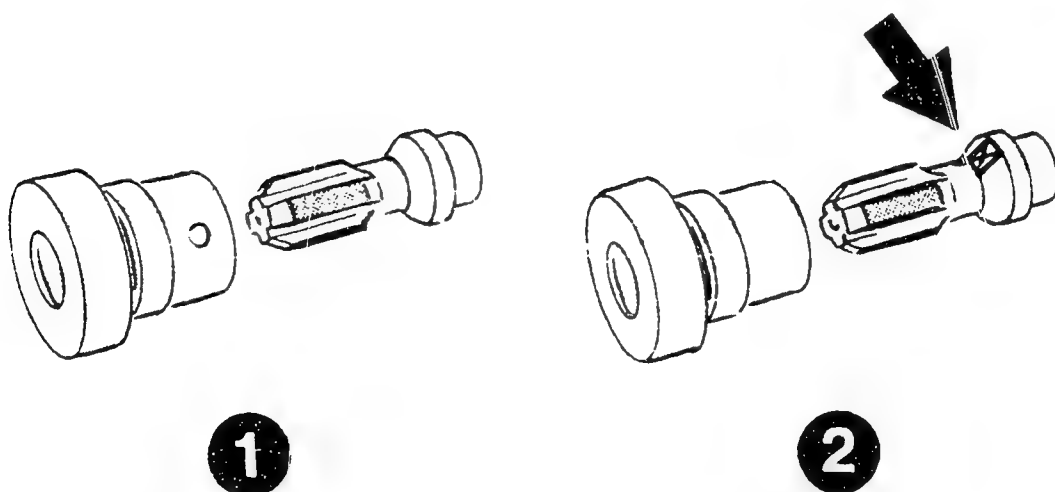
04.1992

0321 En

Some Case/Cummins VE pump applications utilize a new type of delivery valve. This valve is designed in such a way that it has a controlled amount of leakage. This design is called a bypass delivery valve.

There are two different configurations of the bypass valve, a hole type and the flat type. These types are shown below.

1 = Hole type  
2 = Flat type



KMK 02023

The hole type, which was the early version, is replaced by the flat type. When replacing a bypass delivery valve, it is advisable not to mix the different types of valves in the same pump. The pump should have the same type of bypass valve in each outlet.

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ADJUSTMENT OF  
HIGH SPEED STOP SCREW  
BY CUMMINS DISTRIBUTORS

Workshop: EP  
04.1992  
0322 En

On VE 4/12F 1250 R 123 - 0 460 424 006  
pumps, Cummins distributors may read-  
just the high speed stop screw.

The lead seal installed by Bosch on the  
screw during production would have to  
be broken by the Cummins Distributor.  
After readjustment, the Cummins Dis-  
tributor would then install his own  
lead seal, examples of which are shown  
below.

1 = SEDC - Small Engine Development  
Center

2 = CDC-Consolidated Diesel Company

3 = CWI - Cummins Great Lakes, WI.,  
Region

4 = 3521 - \*Cummins Diesel Sales,  
Fargo, North Dakota



**1**



**2**



**3**



**4**

KMK 02024

- \* These are only examples; the seal numbers will change depending on Cummins distributorship. For seal varification, contact the local Cummins Distributor or your Central Distributor.

### I M P O R T A N T !

If either the full load or high speed lead seal is broken or missing when the pump is received, no warranty will be considered.

If a Cummins seal is found on the high speed screw, rather than the Bosch seal, warranty should be considered.

Cummins then will stamp the new high idle speed (in engine rpm's) below the last 4 digits of the 10 digit number, above the serial number.



Should a pump be received for warranty consideration or service, the steps below should be followed.

1. Check for Bosch or Cummins seals.
2. Readjust high idle screw so pump tests to original specification.
3. Evaluate for warranty.
4. Repair as required.

5. Calibrate pump to original specification.
6. Seal as required.
7. If pump requires high idle speed to be readjusted, this should be done on the engine by a Cummins Distributor
8. Cummins Distributor must reseal the high idle speed screw.

NOTE:

On-engine readjustment of the high idle is Cummins responsibility.

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NEW TEST-PRESSURE LINE  
1 680 750 089  
FOR IN-LINE PUMPS

Workshop: EP  
04.1992  
0324 En

As of now, service test specifications will gradually be prescribing the new test-pressure line 1 680 750 089 (8.0x2.5x600 mm) instead of the previously used test-pressure line 1 680 750 015 (6.0x1.5x600 mm). The line prescribed to date is therefore being deleted by IA4 from the available range.

The new test-pressure line has been introduced with a view to coping with the ever increasing hydraulic loads during testing.

The hydraulic values of the test-pressure line 1 680 750 089 correspond to those of the previously used line 1 680 750 015. This means that - if the new test-pressure line is not available - the old test-pressure line 1 680 750 015 can be used for the same test specifications. Mixed utilization of the two lines is not permitted.

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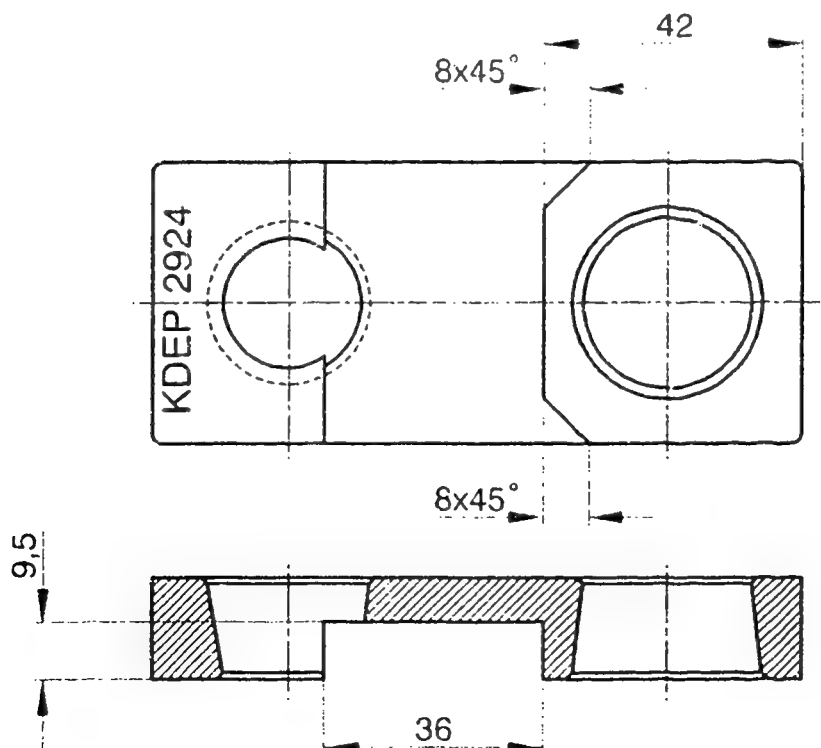
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MODIFICATION OF  
GAUGE KDEP 2924  
FOR P-PUMPS

Workshop: EP  
04.1992  
0325 En

Some P-pump types are fitted on the drive end with a bearing end plate featuring a particularly wide bead for accommodating a seal ring. With these pumps, it is not possible to use the gauge KDEP 2924 in its original form for calibrating the camshaft projection.

The following diagram shows how the gauge is to be modified, so as to enable it to still be used with the fuel-injection pumps already described. Newly supplied gauges KDEP 2924 have already been modified.



KMK 02143

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ZEXEL	Workshop: EP
TEST SPECIFICATIONS	04.1992
EP test-specification	0327 En
list WP-01	
Incorporation of new ZEXEL fuel- injection pumps	

New ZEXEL fuel-injection pumps have been additionally integrated into the EP test-specification list WP-01 as of the 03.92 distribution date.

These fuel-injection pumps are to be checked and adjusted in accordance with test-specification sheets already available for other pumps. For this reason, situations may be encountered where the part number of the pump does not coincide with the part number on the test-specification sheet. For processing reasons, it is not possible to have special identification of these pumps in the list.

Note:  
ZEXEL test specifications can only be found in the list by way of the original ZEXEL part number and this will continue to be the case in the future.



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ADJUSTMENT TOOL  
KDEP 1634 FOR RQ(V)  
GOVERNOR WITH SPLIT  
SPRING SEAT

Workshop: EP  
04.1992  
0328 En

A 2-piece spring seat is being gradually introduced to facilitate adjustment of the flyweight springs on RQ(V) governors.

This new 2-piece spring seat makes for independent adjustment of the pretension of the idle spring on the one hand and the center/inner spring on the other.

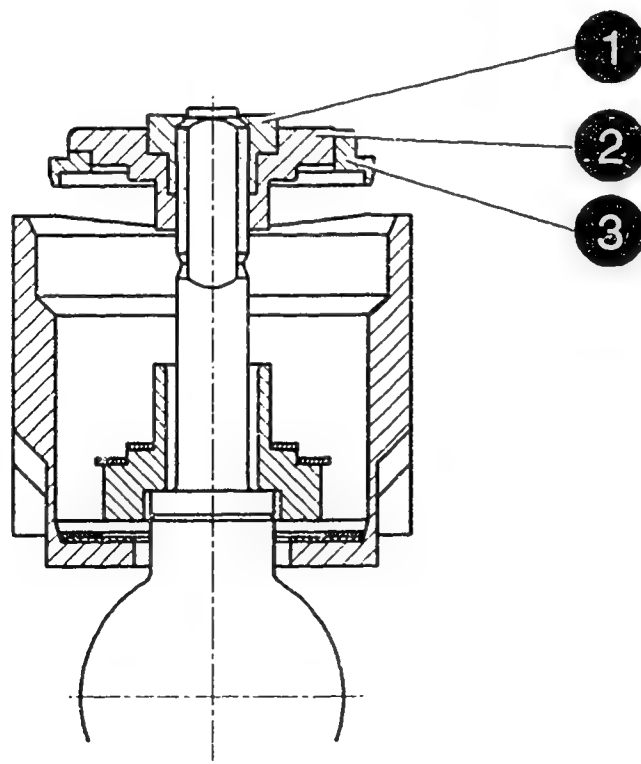
As a result, the upper rated speed is no longer affected when setting/adjusting idle.

On assembling the governor, the split spring seat is to be installed such that the driver pins of the spring seat engage in the center stage of the adjustment ring marked with a notch. For idle adjustment, the adjustment tool KDEP 1634 is used to press the adjustment ring of the split spring seat against the idle spring until its teeth are disengaged from the spring-seat pin.

Starting from the center position, the initial tension of the idle spring can thus be altered by 2 steps in each direction without affecting the initial tension of the center and inner spring. Turning the adjustment ring in a clockwise direction increases the initial tension of the idle spring.

As far as all other operations relating to the repair and adjustment of RQ(V) governors are concerned, there are no changes vis-à-vis the procedure described in the repair and test instructions.

- 1 = Adjustment nut for center and inner spring
- 2 = Spring seat for center and inner spring
- 3 = Adjustment ring for idle spring



KMK02235

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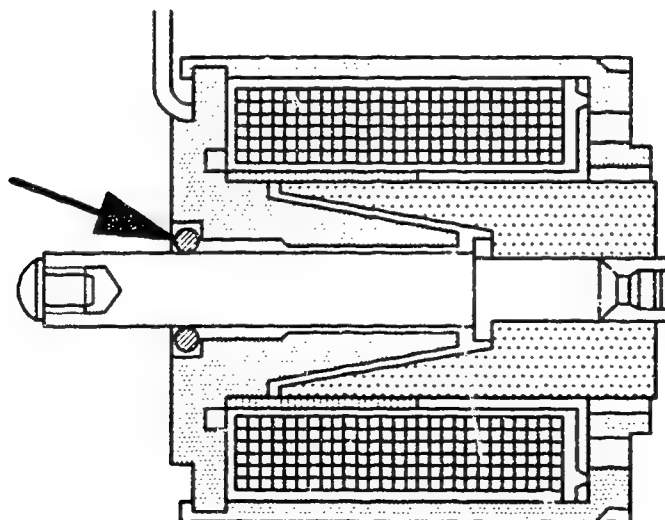
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RE GOVERNOR POSITIONERS  
Transportation safeguard  
in adjusting magnet  
3 427 210 104

Workshop: EP  
04.1992  
0329 En

In the area of the bearing bore for the electromagnet-armature thrust pin, new adjusting magnets feature an O-ring in a groove to stop the electromagnet armature dropping out (picture - arrow).

This O-ring must be removed before installing a new adjusting magnet. The required magnet freedom of movement is not guaranteed with the O-ring in position.



KMK02236

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NEW FULCRUM LEVER  
WITH DEFLECTION ELEMENT  
ON RSV GOVERNORS WITH LDA

Workshop: EP  
04.1992  
0330 En

Setting the LDA on RSV governors has always resulted to date in extremely large adjustment tolerances. A setting with such large tolerances is no longer acceptable on account of ever more stringent emission legislation.

Such unsatisfactory adjustment quality was due to the fact that the deflection element in the inner stop lever is subject to considerable friction. The hysteresis thus produced in the LDA characteristic curve does not permit defined adjustment. As the pressure over the LDA diaphragm decreases, the clearances and elasticities in the governor compound lever are offset before the initial tension of the spring in the deflection element is overcome.

A deflection element was integrated into the fulcrum lever of such governors as a design remedy. This fulcrum lever is known as "buckle lever".

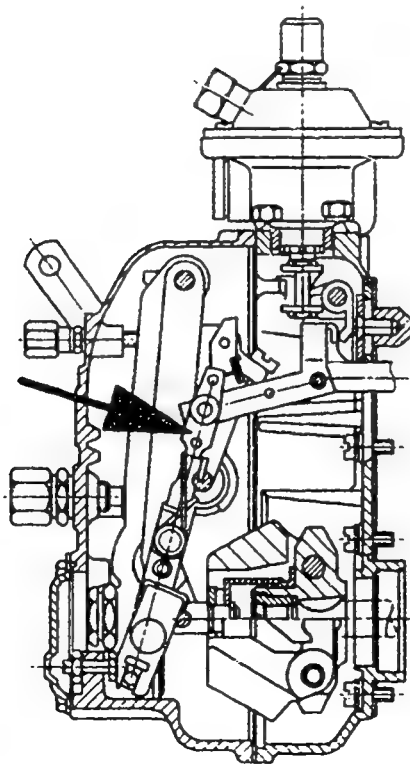


The deflection element in the fulcrum lever is of the low-friction type and requires far less initial tension than the deflection element in the inner stop lever.

The introduction of the buckle lever necessitated a new design for the respective LDA spring. On installing a new fulcrum lever, this means that use must always be made of a new LDA spring as prescribed in the appropriate service-parts list. If this prerequisite is not met, there is no guarantee that the control-rod travels stipulated in the test specifications will be attained.

When disassembling and assembling RSV governors with buckle lever, the same procedure is to be employed as that described in the valid repair instructions (refer to Overview Microcard W-400/000 under "RSV governor repair").

Arrow = Fulcrum lever with deflection element (buckle lever)



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MERCEDES-BENZ  
OM 402 LA  
with P-pump and  
two-stage LDA

Motor vehicle: FZD  
and workshop: EP  
04.1992  
0331 En

Unsatisfactory power output

Complaints about lack of power are frequently received concerning the above-mentioned engines with a power output of 280 kW at 2100 1/min or 1900 1/min. The following procedure is to be adopted if there is still no satisfactory power output even after having the engine tested by a MERCEDES-BENZ workshop and after testing/adjustment of the injection-pump assembly:

1. Block spring retainer of 2nd stage of LDA by giving it three turns.
2. Replace LDA spring of 1st stage with spring 2 424 619 088.
3. Set injection-pump assembly to values given in the following table.

The following injection-pump assemblies are affected:

0 402 648 893  
0 402 648 894  
0 402 648 895  
0 402 648 914

4. Testing and, if applicable, adjustment of start of delivery to 9.5° before TDC.

Test specifications:

Speed 1/min	CRT mm	Pressure hPa	Delivery cm <sup>3</sup> /1000s
800	14.7 to 14.9	1500	234.0 to 238.0
950 or 1050	unchanged as in test specification		
500	10.2 to 10.5	0	134.0 to 136.0

The injection-pump assembly is to be removed for conversion purposes. Following conversion, the new governor designation is to be entered on the governor nameplate in line with the following table.

IP assembly	Governor designation	
	from	to
0 402 648 893	RQ300/950 PA 971-2	RQ300/950 PAV 21041
0 402 648 894	RQV300/950 PA 797-18	RQV300/950 PAV 21043
0 402 648 895	RQ300/1050 PA 972-1	RQ300/1050 PAV 21040
0 402 648 914	RQV300/1050 PA 797-30	RQV300/1050 PAV 21042

The conversion work does not affect the homologation for the vehicles concerned.

The conversion work is to be performed at cost.

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MACK P-7100  
ROLLER TAPPET  
ASSEMBLY FAILURES

Workshop: EP  
06.1992  
0332 En

Combination Numbers:

0 402 746 810 —> 0 402 746 886

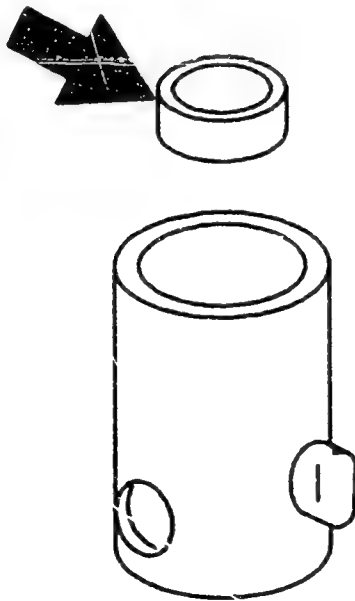
Manufacturing Dates:

Up to 064 Plant code: 015  
Up to 072 Plant code: 927

If it becomes necessary to replace roller tappet assembly 2 418 750 022 because of a broken pressure plate (see illustration), you must replace all 6 with part numbers 2 418 750 041. After doing so, we remind you to check plunger LPC and phasing.



Arrow = Pressure Plate



KMK02600

The exchange of the roller tappet assemblies is to be performed only in the event of breakage.  
Standard warranty terms apply.

ROBERT BOSCH Corporation  
Service Department  
Automotive & Diesel Products  
(UA/ASV)

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RQV-K FULCRUM LEVER  
LEVER ASSEMBLY  
CONTACT

Workshop: EP  
06.1992  
0333 En

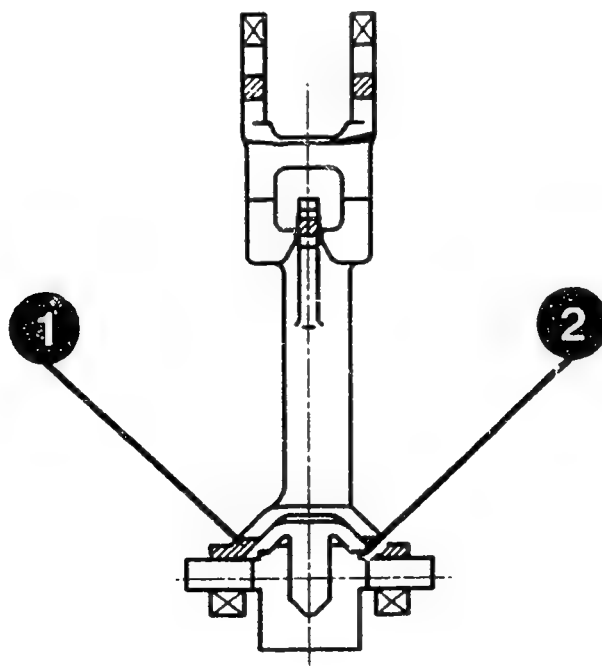
Date of manufacture:  
Before 064 (April 1990)

If, on replacing a fulcrum lever, it is established that this makes contact as shown with the sliding block, DO NOT ALTER THE FULCRUM LEVER IN ORDER TO CREATE A SPACE, but rather replace the sliding block with part no. 2 422 130 038.

- 1 = Do not alter to create space  
2 = Point of contact

**Note:**

When checking whether contact is made,  
it must be ensured that the parts are  
centered as illustrated.



KMK02601

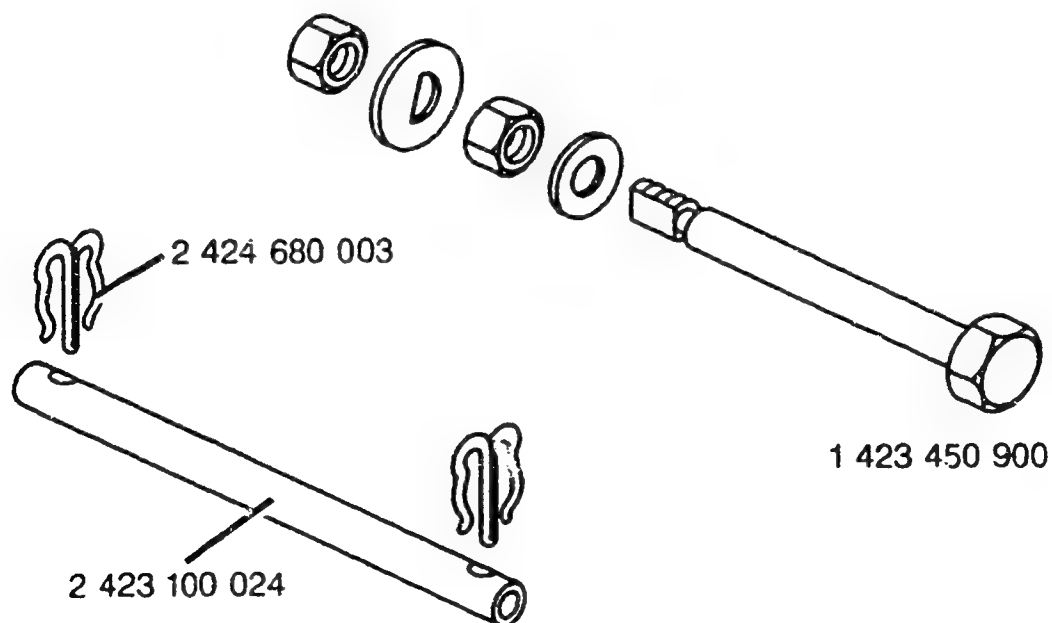
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NEW CROSS-BOLT  
USED IN RQV-K GOVERNORS  
WITH 13 MM GUIDE SLEEVE  
TRAVEL FLYWIGHTS

Workshop: EP  
06.1992  
0334 En

Recent product releases have included  
flywight assemblies that employ a new  
cross-bolt design (see illustration).



KMK02602

If the governor you are serving is  
equipped with the new cross-bold design  
DO NOT USE PARTS SET 1 423 450 900 AS  
A REPLACEMENT.

Service part lists will be updated to  
include the new part numbers and  
delete parts set 1 423 450 900.

In the interim, refer to the above part  
numbers when ordering replacement  
parts.

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GOVERNOR

Workshop: EP

06.1992

Pretreatment of  
LDA diaphragm

0335 En

Diaphragms in boost-pressure-dependent full-load stops are always failing after a brief period of operation due to the fact that they have not been treated properly prior to installation. Diaphragms made of VMO (silicon-rubber blend) are only to be immersed prior to installation in HD 10 lubricating oil and not in ISO-4113 calibrating oil.

Diaphragms made of VMO cannot be readily distinguished from old diaphragms made of a different material. To avoid mix-ups with diaphragms made of other materials, always only immerse diaphragms prior to installation in LDA in HD 10 lubricating oil.

For this reason, care must always be taken when adjusting or testing injection-pump assemblies with LDA to ensure that calibrating oil cannot get into the LDA.



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MAN VEHICLES  
WITH ENGINE

D 2865L.. AND D 2866L..

Motor vehicle: FZD  
and workshop: EP

06.1992

0340 En

Rough engine running

Too much oil in the governor may be the cause of rough engine running (blubbering). By way of a remedy, MAN has introduced measures which are essentially to be performed by MAN themselves. These measures involve the subsequent laying of an oil return line and the installation of a vent line at the injection-pump assembly.

Instead of implementing the above measure, an alternative is to replace the series-installed drive-end bearing end plate of the fuel-injection pump with a different bearing end plate featuring three additional holes. This bearing end plate has the BOSCH Part Number 2 415 551 116.

#### Procedure:

Remove injection-pump assembly from engine. Remove toothed wheel from drive of injection pump. Raise roller tappets as prescribed with tappet holders so as to relieve camshaft.

Loosen and screw out fastening screws of drive-end bearing end plate.  
Remove bearing end plate.  
Note: The bearing rollers drop out. Make sure they do not get lost.  
Carefully remove bearing outer race from bearing end plate with puller.

#### Assembly:

Fit previously used bearing outer race as prescribed into new bearing end plate 2 415 551 116. Pay attention to bearing roller! Attach new seal to bearing end plate.

Install complete bearing end plate into injection pump such that its overflow holes are above the center of the camshaft. Screw in fastening screws for bearing end plate and tighten to prescribed torque. Remove tappet holders from injection pump again. Make sure that the roller tappets are only lowered in the TDC position of the cam concerned.

Insofar as this measure is implemented on the injection-pump assembly of an in-line engine, lines for oil return and venting are to be removed if applicable from the injection-pump assembly.

The connecting holes at the injection pump and the governor are then to be sealed with screw plugs featuring sealing rings.

The above-described remedial measure is the only one which can be employed in the case of underfloor engines. The installation of oil return and vent lines is not possible.

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MAN VEHICLES                      Motor vehicle: FZD  
WITH ENGINE                      and workshop: EP  
D 2865L.. or D 2866L..                      06.1992

Motor vehicle: FZD  
and workshop: EP  
06.1992  
0341 En

## Engine stops at idle

Injection-pump assemblies with RQV..K governors, in particular with steep breakaway characteristic (vehicles with intermediate-speed stop), feature a sharp drop in hydraulic delivery if the idle speed setting is too low.

The engine may cut out at low idle in the event of considerable power consumption due to auxiliary units (e.g. refrigerant compressor) at high fuel temperature.

The remedy is then to precisely set the low rated speed with warm engine. The figure is 650... max. 700 1/min for the engine D 2865 L., and 600... max. 650 1/min for the engine D 2866L... Use is always to be made of a vehicle-independent rev counter for the precise adjustment of this speed.

If the engine still comes to a halt at idle despite implementation of this measure, the complete injection-pump assembly is to be removed from the engine and checked on an injection-pump test bench/subjected to precise adjustment in line with test specifications.

If warm-starting problems are then encountered, there is no other solution at present than to depress the accelerator pedal somewhat when starting.

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FUEL INJECTION PUMP  
SIZE "R"

Workshop: EP  
06.1992  
0342 En

## Service Procedure

### INTRODUCTION

Since November 1991 the scope of Bosch in-line pumps has been extended by one more type: size R.

The type designation of this pump is:  
PE 6 R 120/720 RS 1502  
0 401 496 001

The R-pump is used in connection with an electronic actuator (RE 31) already familiar from the present EDC in-line pump systems (RE 24 with P..S 3000 and R 30 with P... 7100).

The first customer using this new pump, is Volvo truck, Sweden.  
The pump is fitted to the vehicle F16 with engine TD 163.

An alternative service concept has been agreed to with Volvo which will be described as follows.

## HANDLING OF SERVICE CASES

According to Volvo's warranty claim treatment all Bosch injection pumps must be handled directly through the local Bosch Diesel agent. This procedure also applies to the R-pump.

Due to the relatively small numbers of this pump service capacity will not yet be established at the Bosch Diesel agents for repair and testing.

Instead, in the event of a warranty claim, the customer will receive a complete exchange pump free of charge through the Bosch Diesel agent. Costs for expressdelivery will not be passed on to the customer (other warranty costs).

Bosch Diesel agents will be credited through the Bosch warranty system.



Within Germany R-pumps handed over the Bosch Diesel agent under warranty will be send together with the warranty report (G20) to:

Robert Bosch GmbH  
PW/ALP6 Auspackraum 673/1  
z. W. an K5/QSG  
Am Boschwerk  
D-7000 Stuttgart 30

and abroad with warranty report (G21) to the Bosch national representative who will pass the pump on to K5/QSG1 in Germany.

The pumps will be examined by Bosch. The Bosch Diesel agent will receive an examination report through the Bosch national representative.

The service pcedure outside the warranty period will be announced at the end of 1992.

**IMPORTANT NOTE:**

Service cases on R-pump must be treated with high priority since Volvo Truck has guaranteed its customers the mobility of their vehicles.

This applies especially to the F16.

Therefore Bosch Diesel agents will order R-pumps if necessary on a "VOR" basis by express delivery through the normal order channels. All personnel involved in Diesel Service and parts disposition must be instructed to strictly follow the "VOR"-procedures if the situation demands this.

All Bosch Diesel agents are requested to contact their Volvo dealers to offer their Diesel Service support and to mutually agree on close cooperation.

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(KH/VKD 2)

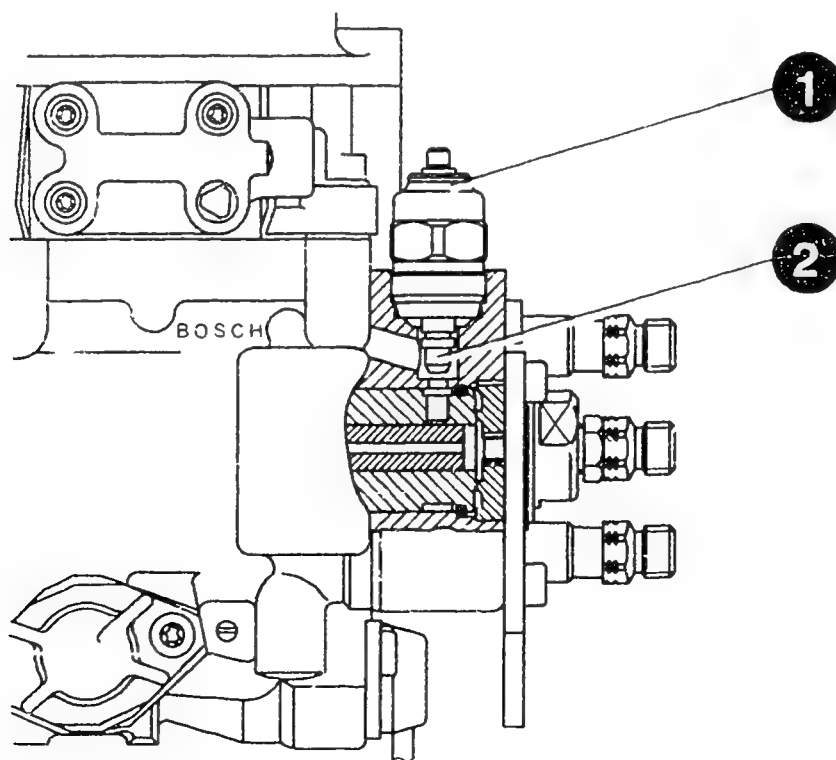
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ELECTRIC  
SHUTOFF DEVICE (ELAB)  
WITH CHECK VALVE (RSV)  
0 330 001 024

Workshop: EP  
08.1992  
0343 En

The electric shutoff device (ELAB)  
features the following characteristics:

- \* Red plastic encapsulation of  
electrical connection (1)
- \* Check valve in electromagnet  
armature (2) (holes on end face  
and on side at end)



KMK02765

## Functional description

Once the ELAB has been switched off, a small amount of fuel is allowed to pass through via the check valve. This ensures that the ELAB reliably seals off the fuel inlet bore.

The safety function "Emergency shutoff" is thus guaranteed.

## Important information; always observe!

An ELAB with check valve is currently installed with the following VE..E distributor-type fuel-injection pumps:

- \* VE..E..L 323
- \* VE..E..L 400

If a different ELAB is fitted, this must be replaced by an ELAB with RSV.

There may, however, also be ELAB with RSV in the field which do not feature a n y red plastic encapsulation of the electrical connection. Such ELAB can o n l y be recognized from the check valve in the electromagnet armature.

If there is no check valve in the electromagnet armature, the complete ELAB is to be replaced by an ELAB with RSV.

This must be done to guarantee the safety function "Emergency shutoff".

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MERCEDES BENZ  
ENGINES WITH  
P-PUMP AND  
2-STAGE LDA

Motor vehicle: FZD  
and workshop: EP  
10.1992  
0347 En

Unsatisfactory power output

OM 402 LA

Complaints may be received about power/  
fuel consumption in the case of these  
engines with an output of 280 kW at  
2100 1/min or 1900 1/min.

If, after the engine has been checked  
by a MERCEDES BENZ Service Station and  
the injection-pump assembly has been  
tested/readjusted, there is still no  
satisfactory power output, proceed as  
follows:

1. Block spring retainer of 2nd stage  
of LDA by turning through three  
revolutions.
2. Replace LDA spring of 1st stage with  
spring 2 424 619 088.
3. Adjust injection-pump assembly to  
values given in the following table.

The injection-pump assemblies indicated below are affected:

0 402 648 893

0 402 648 894

0 402 648 895

0 402 648 914

4. Check and, if necessary, adjust start of delivery to 9.5° before TDC.

The following test specifications initially apply:

n 1/min	CRT mm	Press- ure hPa	Delivery cm3/1000S
800	14.7	1500	234.0
	—		—
	14.9		238.0
950 / 1050	Unchanged as in test specifications		
500	10.2	0	134.0
	—		—
	10.5		136.0

Conversion is to be effected with the injection-pump assembly removed.

#### 5. LDA start of advance

The start of advance of the LDA is to be set to 600 1/min. The increase in control-rod travel is 0.1...0.3 mm at 175 hPa.

#### OM 442 A

Complaints may be received about power/fuel consumption in the case of these engines with an output of 250 kW at 2100 1/min.

If, after the engine has been tested by a MERCEDES BENZ Service Station and checking/readjustment of the injection-pump assembly, there is still no satisfactory power output, proceed as follows:

1. Block spring retainer of 2nd stage of LDA by turning through three revolutions.



2. Replace LDA spring of 1st stage with spring 2 424 619 104.
3. Adjust injection-pump assembly to the values indicated in the following table.

The injection-pump assemblies outlined below are affected:

0 402 648 900

0 402 648 901

The following test specifications initially apply:

n 1/min	CRT mm	Press- ure hPa	Delivery cm <sup>3</sup> /1000S
1050		1200	193.0
			195.0
600		1200	209.0
			212.0
500		0	138.0
			140.0

Conversion is to be carried out with the injection-pump assembly removed.

#### 4. LDA start of advance

The start of advance of the LDA is to be set to 600 1/min. The increase in control-rod travel is 0.1...0.3 mm at 225 hPa.

#### OM 442 A

Complaints may be received about power/fuel consumption in the case of these engines with an output of 250 kW at 1900 1/min.

If, after the engine has been checked by a MERCEDES BENZ Service Station and the injection-pump assembly has been tested/readjusted, there is still no satisfactory power output, proceed as follows:

1. Block spring retainer of 2nd stage of LDA by turning through three revolutions.

2. Replace LDA spring of 1st stage with spring 2 424 619 104.
3. Adjust injection-pump assembly to values given in the following table.

The injection-pump assemblies indicated below are affected:

0 402 648 909

0 402 648 910

The following test specifications initially apply:

n 1/min	CRT mm	Press- ure hPa	Delivery cm <sup>3</sup> /1000S
950		1200	207.0 — 209.0
600		1200	209.0 — 212.0
500		0	138.0 — 140.0

Conversion is to be effected with the injection-pump assembly removed.

#### 4. LDA start of advance

The start of advance of the LDA is to be set to 600 1/min. The increase in control-rod travel is 0.1...0.3 mm at 225 hPa.

#### OM 401 LA

Complaints may be received about power/fuel consumption in the case of these engines with an output of 230 kW at 1900 1/min.

If, after the engine has been checked by a MERCEDES BENZ Service Station and the injection-pump assembly has been tested/readjusted, there is still no satisfactory power output, proceed as follows:

1. Block spring retainer of 2nd stage of LDA by turning through three revolutions.

2. Adjust injection-pump assembly to values given in the following table.

The injection-pump assemblies indicated below are affected:

0 402 646 917

0 402 646 926

The following test specifications initially apply:

n 1/min	CRT mm	Press- ure hPa	Delivery cm3/1000S
950		1100	235.0 - 239.0
600		1100	240.0 - 242.0
500		0	134.0 - 136.0

Conversion is to be effected with the injection-pump assembly removed.

### 3. LDA start of advance

The start of advance of the LDA is to be set to 600 1/min. The increase in control-rod travel is 0.1...0.3 mm at 190 hPa.

### OM 401 LA

Complaints may be received about power/fuel consumption in the case of these engines with an output of 230 kW at 2100 1/min.

If, after the engine has been checked by a MERCEDES BENZ Service Station and the injection-pump assembly has been tested/readjusted, there is still no satisfactory power output, proceed as follows:

1. Block spring retainer of 2nd stage of LDA by turning through three revolutions.

2. Adjust injection-pump assembly to values given in the following table.

The injection-pump assemblies indicated below are affected:

0 402 646 930

0 402 646 929

The following test specifications initially apply:

n 1/min	CRT mm	Press- ure hPa	Delivery cm <sup>3</sup> /1000S
1050		1100	234.0 — 237.0
600		1100	240.0 — 242.0
500		0	134.0 — 136.0

Conversion is to be effected with the injection-pump assembly removed.

### 3. LDA start of advance

The start of advance of the LDA is to be set to 600 1/min. The increase in control-rod travel is 0.1...0.3 mm at 190 hPa.

#### Important:

Following conversion, a letter "X" is to be marked on the rating plate of the fuel-injection pump behind the assembly part number.

Test specifications and service-parts lists for these converted injection-pump assemblies (variants) will be gradually published on microcard WP.. or EP.. in line with the basic pump concept (see Service Info).

The conversion work does not affect the homologation for the vehicles concerned.

The conversion work is to be performed at cost.



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RVI VEHICLES  
WITH INJECTION  
PUMP ASSEMBLY  
0 402 748 802

Motor vehicle: FZD  
and Workshop: EP  
10.1992  
0349 En

Conversion of overloaded  
LDA diaphragms

Assembly: 0 402 748 802  
Pump : PES 8 P 120 A 920/4 LS 7159  
0 412 728 801  
Governor: RQV 325...1050 PA 848-21 K  
0 421 815 201  
Engine : MACK EE9-502

If the complaint "Leaking LDA  
diaphragm" is received about the  
above-mentioned IP assembly, then the  
LDA must be converted.

CONVERSION ONLY IN THE EVENT OF A  
COMPLAINT!

The conversion work affects the  
following LDA:

- \* 2 427 133 583
- \* 2 427 133 628
- \* 2 427 133 751

Not affected:

- \* 2 427 133 751
- as of date of manufacture (FD) 264

The following parts must be re-ordered  
and replaced using the part no. quoted  
after them.

LDA 2 427 133 583

Plate washer (item 2): 2 420 551 010

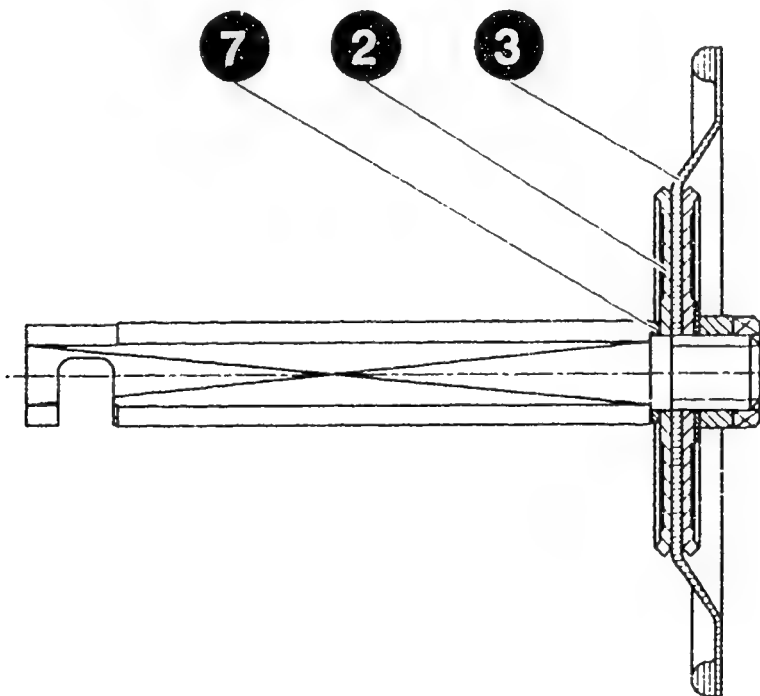
Diaphragm (item 3): 2 420 503 019

LDA 2 427 133 628 and 2 427 133 751

Plain washer (item 7): 2 420 100 070

Plate washer (item 2): 2 420 551 007

Diaphragm (item 3): 2 420 503 019

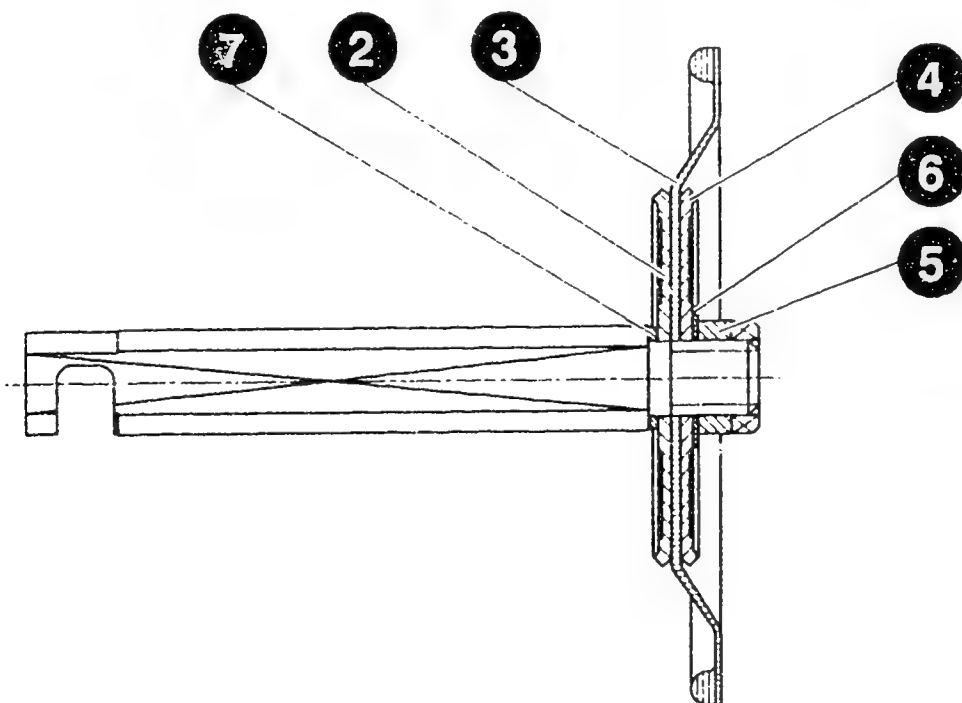


KMK02845

## DISASSEMBLY AND CLEANING

- \* Unscrew LDA stop cover
- \* Disassemble individual parts of lifting rod (lifting rod remains in situ!)

Item	2 427 133 583	2 427 133 628/751
5	Hexagon nut	Slotted nut
6	Spring washer	Spring washer
4	Plate washer	Plate washer
3	Diaphragm	Diaphragm
2	Plate washer	Plate washer
7		Plain washer



KMK02846

- \* Thoroughly remove adhesive residue from thread of lifting rod (with steel brush, brass brush or thread cutter)
- \* Remove abrasion and any dirt deposits from spring chamber of LDA housing

#### ASSEMBLY

- \* Pull out LDA lifting rod as far as it will go in direction of LDA cover and hold in this position by tilting it slightly
- \* Apply Loctite 242 (blue) to thread of lifting rod

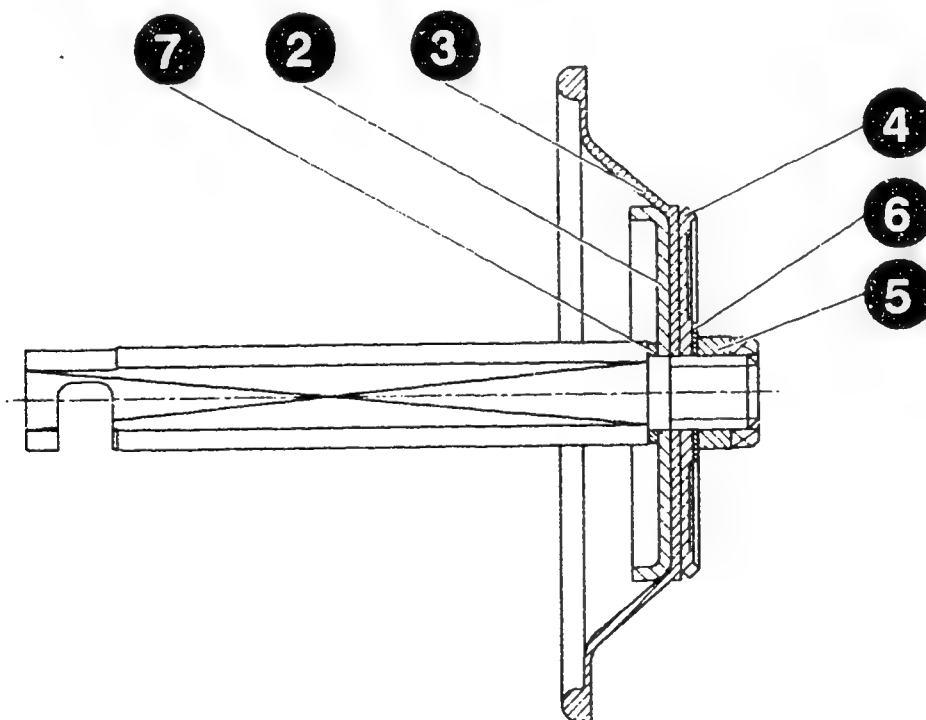
Attach/screw individual components to lifting rod in following order:

Item	2 427 133 583	2 427 133 628/751	
7		Plain washer	N
2	Plate washer	Plate washer	N
3	Diaphragm	Diaphragm	N
4	Plate washer	Plate washer	V
6	Spring washer	Spring washer	V
5	Hexagon nut	Slotted nut	V

"N"=New part / "V"=Existing part

Note:

Sealing bead of diaphragm must face LDA housing



KMK02847

- \* Check whether diaphragm sealing bead is in housing groove
- \* Centrally align diaphragm on LDA lifting rod
- \* Place diaphragm fastening nut in position by hand and tighten to 3.5...4.0 Nm
- \* Check diaphragm for correct seating and absence of folds

- \* Assemble LDA stop cover

Use is to be made of the following fasteners when assembling the LDA stop cover:

For LDA 2 427 133 583  
(all dates of manufacture)

Qty.	Designation	Part no.
4	Lock washer	2 916 699 083
1	Shear bolt	2 423 450 005
3	Cheesehead bolt	2 910 022 197

For LDA 2 427 133 628 /..751 up to  
FD 261

Qty	Designation	Part no.
4	Lock washer	2 916 699 083
1	Shear bolt	2 423 450 005
3	Cheesehead bolt	2 910 022 197

For LDA 2 427 133 628 / ..751 as of  
FD 261

3	Lock washer	2 916 699 083
1	Shear bolt	2 423 450 005
3	Cheesehead bolt	2 910 022 197
1	Protective cap	2 420 505 014
1	Spring washer	2 420 150 003
1	Spacer ring	2 420 200 021

## TIGHTENING TORQUES

Fastening screws for  
LDA stop cover

5.0...7.0 Nm

Shear bolt for LDA

\* 2 427 133 583

1.5...2.5 Nm

\* 2 427 133 628

1.5...2.5 Nm

\* 2 427 133 751

2.0...3.0 Nm

Diaphragm fastening  
nut

3.5...4.0 Nm



## CONCLUDING WORK

- \* Pay attention to curing time of 12 hours for Loctite on lifting-rod thread
- \* Check lifting rod - diaphragm - housing assembly for leaks; boost-pressure side must be pressure-tight to ensure proper LDA function
- \* Check LDA profile in accordance with appropriate test-specification sheet for series pump and adjust if necessary
- \* Seal LDA following testing/adjustment.

## NOTES

- \* Conversion is to be indicated on warranty form under fault no. 62.
- \* Following conversion, designation  
PA 848-21 K  
is to be made illegible on governor rating plate.

The governor trial number  
PAV 21277 K  
is then to be stamped on the governor rating plate.

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DIESEL FUEL-INJECTION PUMPS      004.92 En  
10.1992

Telephone enquiries concerning  
IP test specifications and conversion

There has recently been a considerable increase in the number of enquiries concerning IP test specifications and governor conversion. We are currently dealing with more than 600 BD enquiries every month.

In order to be able to deal with these enquiries as quickly as possible in your own interest, we would ask you once again to adhere to the procedures described below.

Test specifications:

If adjustment is necessary following IP repair, a check should be made PRIOR TO repair as to whether the test specifications are contained in the WP microcards, so as to make for immediate ordering where necessary.

Governor conversion:

Please make use of the form

"Enquiry concerning conversion of  
IP assembly"

so as to avoid time-consuming  
enquiries on our part. Without this  
form we cannot process your enquiry  
for legal reasons.

Note:

Experience has shown that the  
processing of enquiries in conjunction  
with various Bosch departments and  
vehicle manufacturers can often take  
several hours or even days in  
exceptional circumstances where  
conversion is concerned. Please take  
this into account as regards your job  
planning.

- \* IP enquiries can be made at any time in Germany by contacting KH/VSK in Wernau using the usual telephone numbers (answering machine outside business hours) or by way of the Fax no. 07153/306-714.
- \* Outside Germany, IP enquiries are to be addressed to your local BOSCH representative.

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IP ASSEMBLIES  
WITH RSV GOVERNORS  
ON ALTERNATOR UNITS

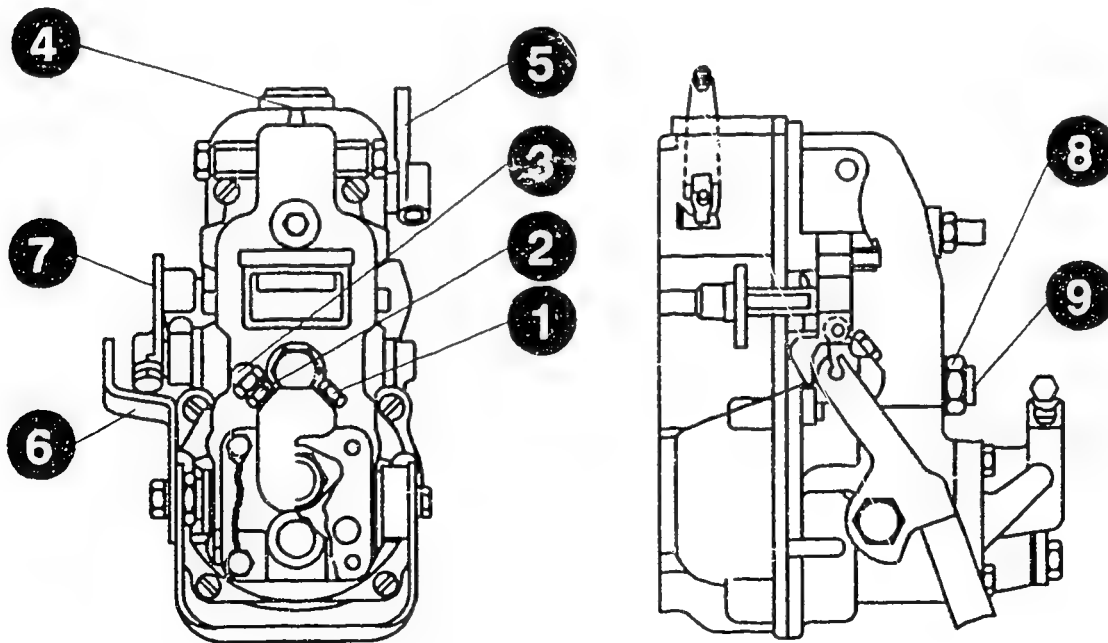
Workshop: EP  
10.1992  
0351 En

Adjustment instructions

On numerous engines, increasing use is being made for applications involving alternator units of RSV governors with stabilizer. In the event of subsequent attachment or replacement of a stabilizer, it may be necessary to perform adjustment corrections. Venting is also required.

## Stabilizer venting:

Remove vent screw (1). Loosen lock nut (2) and screw out throttle screw (3) 4...5 turns. Remove screw plug (4) at governor housing and fill governor with approx. 1 liter of motor oil. It must always be guaranteed that the oil level in the governor is higher than the screw plug (1). Move upper (5) or lower (6) stop lever back and forth until oil emerges without bubbles at tapped hole of screw plug (1). Screw plugs (1) and (4) back in again.

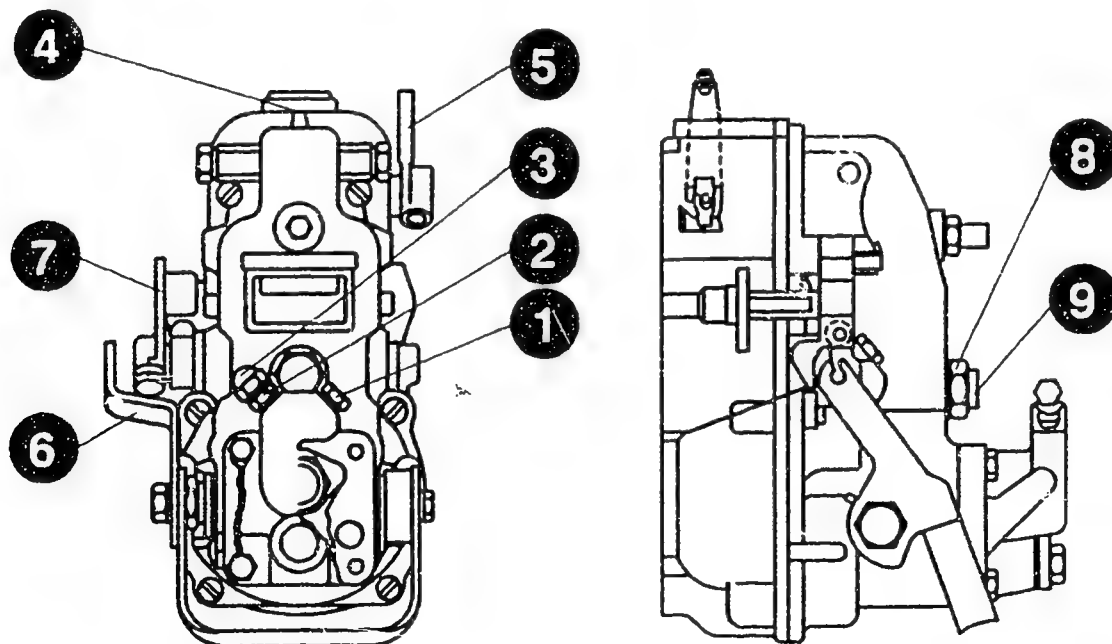


KMK02908

Screw in throttle screw (3) as far as it will go. Then slowly screw it out again until the engine speed is stable. Tighten lock nut (2).

#### Checking governor setting:

Warm up engine to steady state temperature. Check speed/frequency with 100 % load. Correction is effected at speed control lever (7). Check maximum speed without load. The speed droop related to 100 % load must be between 4 and 5 % (at rated speed 1500 1/min speed must be between 1560 and 1575 1/min without load).

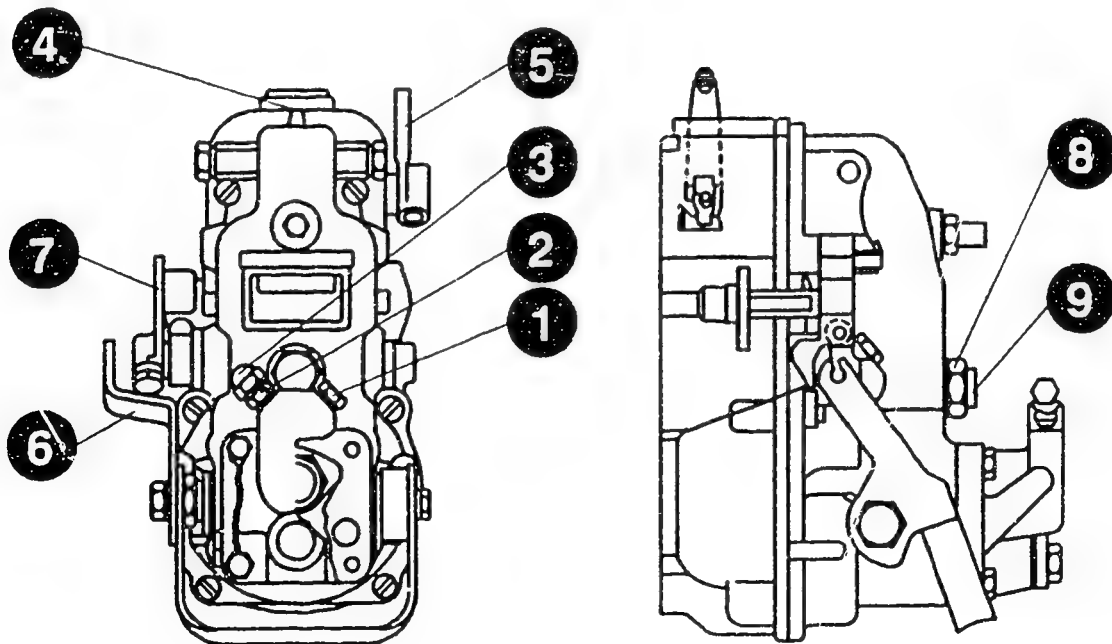


KMK02908



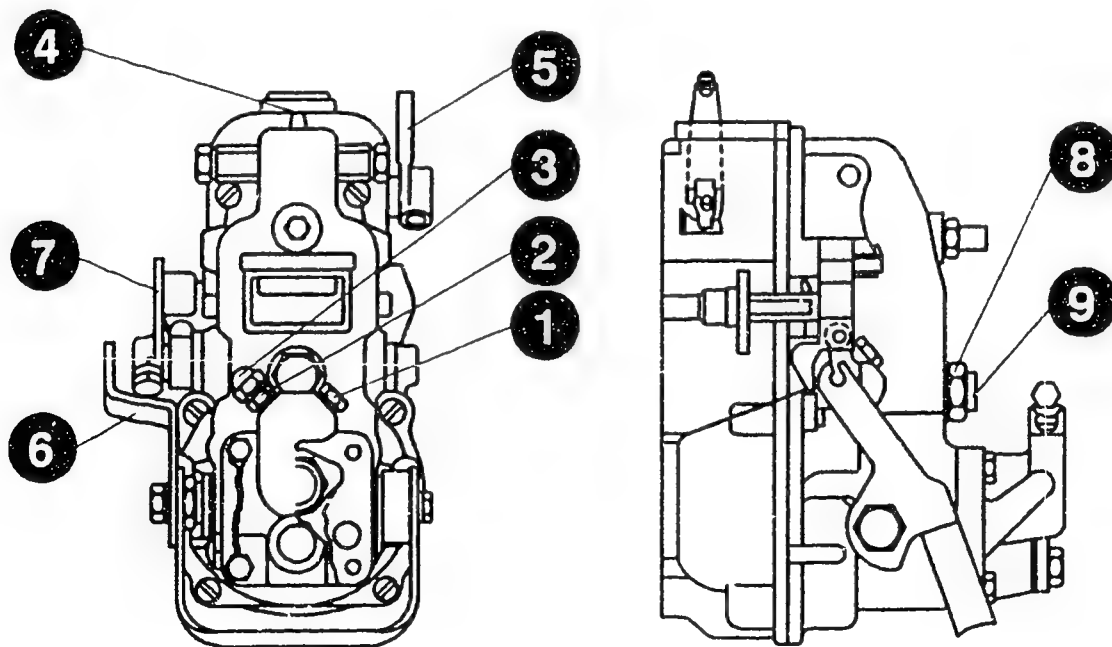
Check running behavior of engine in breakaway curve. Proceed as follows if speed fluctuations occur:

Loosen lock nut (8) and screw out auxiliary idle screw (9) approx. 3...4 turns to ensure that it no longer makes contact with governor tensioning lever. The speed droop must now be at least 3.5 %, i.e. at rated speed 1500 1/min the speed must be at least 1553 1/min in no-load operation. If the speed droop is less than 3.5 %, the initial tension of the governor spring must be altered.



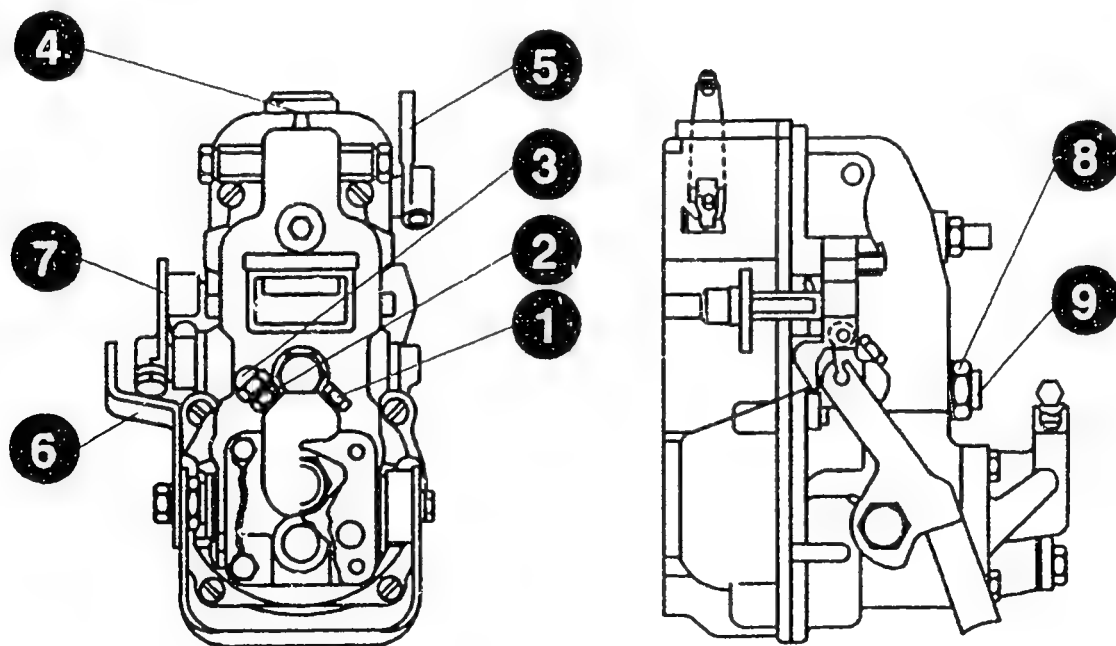
KMK02908

To do so, remove upper screw plug (4). Fully pretension governor spring at notched screw and release again by approx. 9 notches. Correct rated speed at 100 % load at speed control lever. Check speed without load and without setting auxiliary idle spring (9) (speed droop must be within 3.5 %). If the speed droop is in excess of 3.5 %, the governor spring must be further detensioned. Note: The governor spring must not be detensioned by more than a total of 22 notches. Screw in auxiliary idle spring (9) until engine speed increases by roughly 10 1/min. The speed droop may then be a maximum of 5 %.



KMK02908

- 1 = Screw plug  
(vent screw)
- 2 = Lock nut
- 3 = Throttle screw
- 4 = Screw plug
- 5 = Upper stop lever
- 6 = Lower stop lever
- 7 = Speed control lever
- 8 = Lock nut
- 9 = Auxiliary idle sprin



KMK02908

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Division KH  
After-Sales-Service Department for  
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FUEL-INJECTION PUMPS  
P 10

Workshop: EP  
10.1992  
0354 En

Loose pipe connections

The delivery-valve holder 9 413 364 879 used in various P 10 pumps features a screw-in pipe connection. In view of the fact that the complete delivery-valve holder is a preassembled unit and therefore not intended for disassembly, no tightening torques are published for the tightening of the pipe connection in the complete delivery-valve holder.

Normally, the pipe connection in the delivery-valve holder will not work loose of its own accord. There are, however, known instances where this has occurred. Should this be the case in exceptional circumstances, the pipe connection is to be tightened again to a tightening torque of 120...130 Nm. It is to be noted that the thread is a left-hand thread. The pipe connection is never to be turned out further, since this results in complicated installation of the flow restrictor beneath it. Such a course of action is only possible at the manufacturers. Disassembled delivery-valve holders are therefore to be scrapped and replaced with new ones.

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SERIES PES..M  
FUEL-INJECTION PUMPS

Workshop: EP  
10.1992  
0356 En

Introduction of  
spring-chamber closing covers  
made of diecast aluminium

On M-pumps with and without  
start-of-delivery sensor system  
(first/second generation) the previous  
metal spring-chamber closing cover is  
being replaced by a diecast aluminium  
cover. In service-part situations, the  
metal spring-chamber closing cover can  
be replaced by a diecast aluminium  
cover even if there are no additional  
support points for the cover on the  
pump housing.

Pay attention to tightening torque  
5...7 Nm when fitting new cover.  
In the event of a lower tightening  
torque, adequate freedom from leaks  
after the sealing-frame settling time  
is not guaranteed.

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SCANIA COMMERCIAL VEHICLES  
WITH EDC  
PE 8 P... WITH RE 30

005.92 En  
10.1992

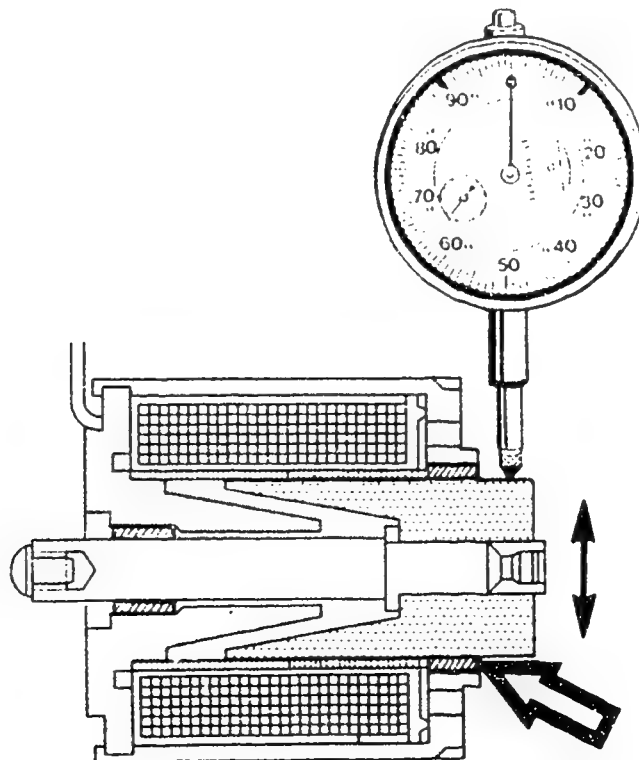
## IDLE INSTABILITY

Complaint: Unstable idle-speed control behavior is sometimes encountered on Scania commercial vehicles featuring the 8-cylinder engine series DSC 14..and EDC. In the event of extreme instability, the self-diagnosis indicates fault 10 "Permanent deviation". This fault may occur on vehicles from all model years since the start of series production in 1989.

### Cause of trouble:

The problem is usually caused by a stiff electromagnet armature in the adjusting magnet of the RE positioner due to one-sided wear of the large electromagnet-armature bushing (picture, arrow).

Such wear cannot be detected during normal testing of the IP assembly on an IP test bench. For this reason, should such complaints be received, the adjusting magnet is to be removed and the bearing wear measured.

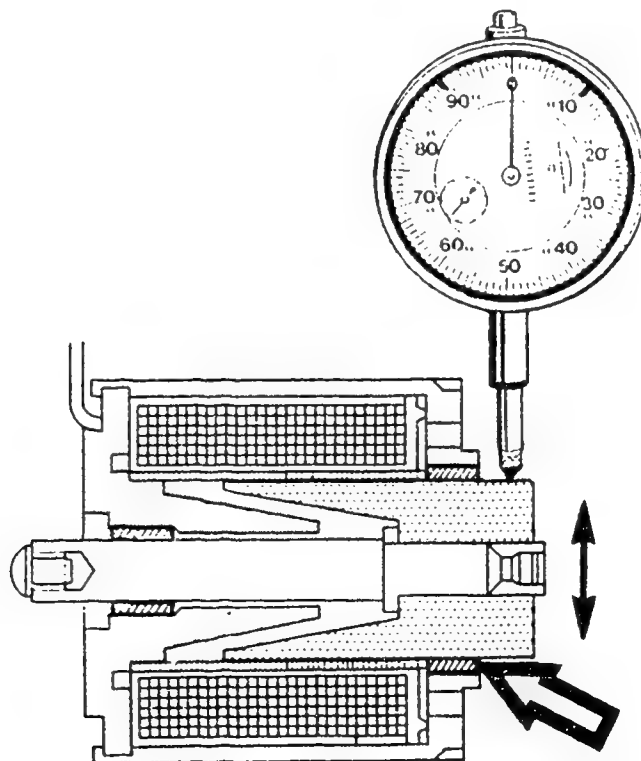


KMK 03078

## Fault determination and correction:

The following work is based on the repair and test instructions for RE positioners VDT-W-400/019, the information in which is to be precisely followed.

- Completely remove positioner cover.
- Unsolder electrical connections of control-rod-travel sensor and adjusting magnet at connection plate (pay attention to soldering specifications).
- Remove control-rod-travel sensor and adjusting magnet.
- Check large bushing in adjusting magnet (arrow) for wear.



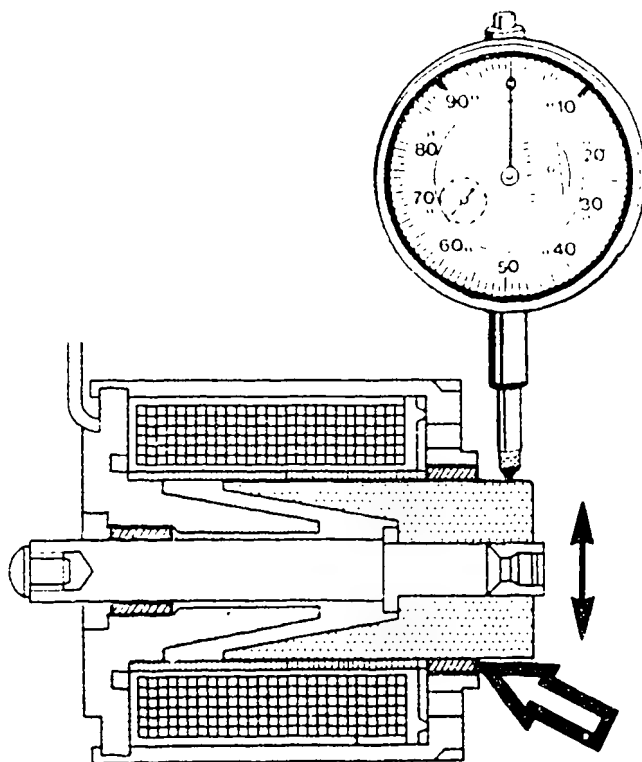
KMK 03078

## Checking bearing clearance:

### Tools required:

- Prism for holding adjusting magnet
- Stand, commercially available,  
e. g. Bosch 4 851 601 124
- Dial indicator, 0.01 mm  
graduations, commercially available,  
e.g.. Bosch 1 687 233 011

Procedure: Place magnet in prism.  
Pull electromagnet armature somewhat  
out of housing and align dial  
indicator at armature directly  
adjacent to large bushing. Move  
armature in vertical direction within  
bearing clearance; in doing so, turn  
magnet in prism to several positions  
and establish maximum bearing  
clearance.



KMK 03078

The max. bearing clearance for the large bushing is 0.12 mm.

The adjusting magnet is to be renewed if the limit value is exceeded.

The magnet and control-rod-travel sensor are to be installed and the positioner assembled on the basis of the repair instructions.

Attach injection pump to test bench. Set control-rod-travel sensor as per test instructions and check/adjust pump.

#### Warranty:

If the complaint described above is found to be the reason for a defective adjusting magnet, Bosch will grant goodwill up to a maximum of 200,000 km for a further year over and above the usual warranty period of one year with unlimited mileage.

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RQV-K GOVERNORS

Workshop: EP

12.1992

Wear assessment for linkage  
lever components

0305 En

If the governor is mainly operated at one load point, the linkage lever components may be subjected to increased wear.

When driving, such wear may become apparent in the form of speed reduction at full load.

Wear on the linkage-lever components is to be determined when carrying out governor repairs.

The individual linkage-lever components are as follows:

- Driving pin and sliding piece
- Cam
- Variable-fulcrum lever

To determine the degree of wear, use is to be made of a commercially available caliper gauge with dial indicator.

Measurement accuracy: 0.02 mm

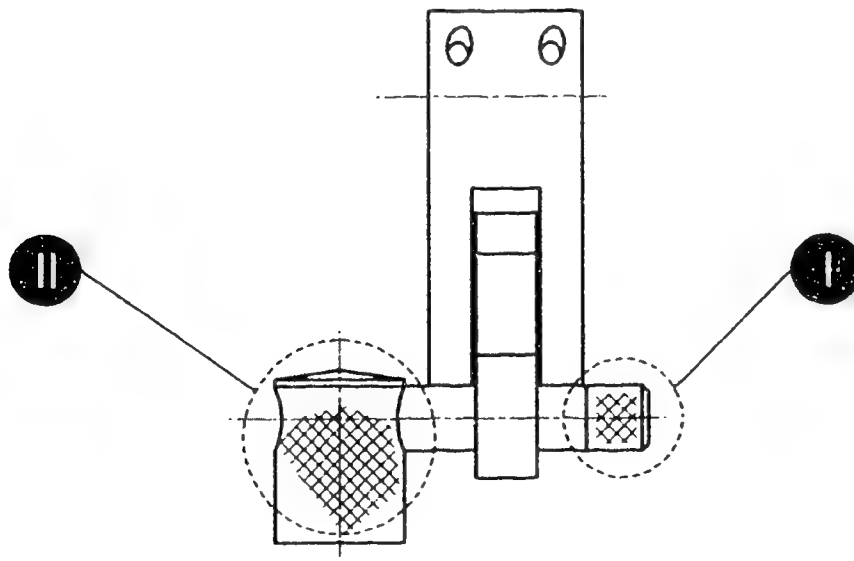
## Testing and repair instructions

### Driving pin and sliding piece Measurement, area I

The point of maximum wear is to be determined by means of radial rotation of the caliper gauge about the driving pin in area I.

Wear dimension: 5.940 mm

If the wear dimension is obtained or not reached, the entire assembly is to be replaced.



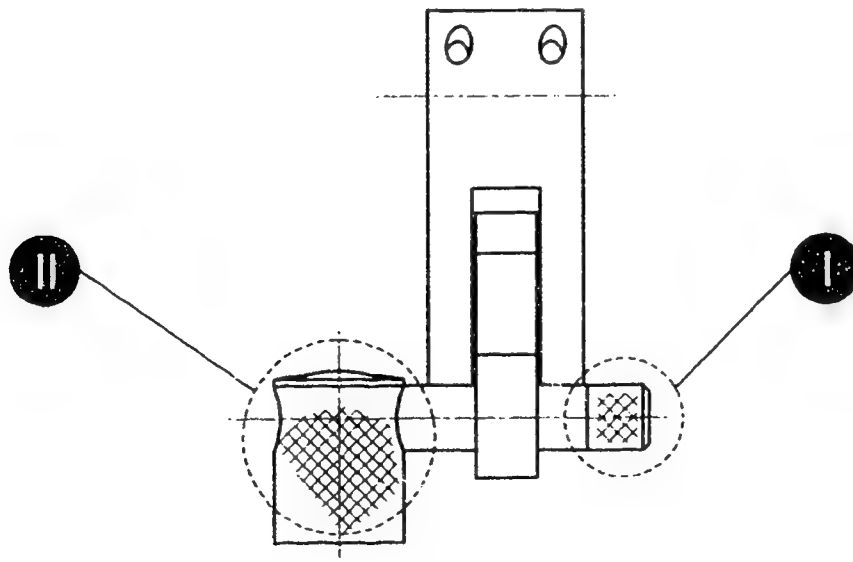
KMK01709



Driving pin and sliding piece  
Visual inspection, area II

1. Clearly noticeable axial scoring in loaded area of lateral surface (opposite guide pin welded on end face)
2. Fiber-like grooving in above-mentioned area starting from copper-colored, convex end face of sliding piece

If one of the two situations outlined above is encountered, the assembly is to be renewed. The variable-fulcrum lever is likewise to be assessed.



KMK01709

The assembly need not be renewed if the surface is slightly shiny but not scored.

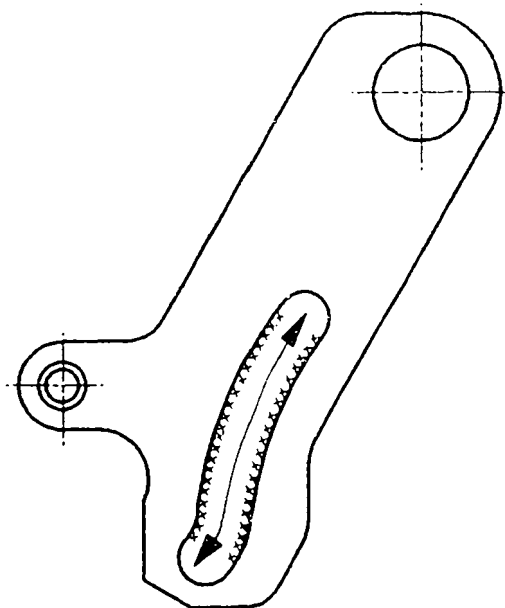
## Cam

Visual inspection of working area  
(hatched areas in illustration)

1. Pocket-like wear in working area of driving pin
2. Heavy grooving in working area of driving pin

The cam is to be renewed if one of the two situations outlined above is encountered.

The cam need not be renewed if there are shiny areas in the working area of the driving pin, but no noticeable scoring.



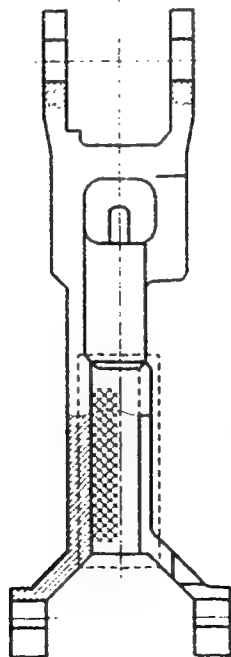
KMK01710

### Variable-fulcrum lever

Visual inspection of working area  
(hatched areas in illustration)

1. Heavy scoring or material abrasion in working area of variable-fulcrum lever guide
2. Pocket-like wear in working area of variable-fulcrum-lever guide

The variable-fulcrum lever is to be renewed if one of the two situations outlined above is encountered.



KMK01711

The variable-fulcrum lever need not be renewed if there is slight tracking, but no noticeable scoring, in the working area of the variable-fulcrum-lever guide.

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EDC  
IN-LINE PUMPS  
PE..P.. WITH RE POSITIONER

Workshop: EP  
12.1992  
0359 En

Contact problems with  
positioner connected

Complaint:

There have been individual instances  
of the engine cutting out in the past  
whilst driving in the case of  
commercial vehicles with EDC  
in-line pumps and RE positioner.

Such cutting-out of the engine is  
usually followed by the EDC self-  
diagnosis indicating the fault  
"Permanent deviation". In view of  
the fact that this fault code can  
normally be attributed to a fault  
in the injection-pump assembly, the  
pump is removed and handed over to  
the appropriate Bosch service station  
for repair and testing.

Cause of problem:

Checks made on the RE positioners of such injection-pump assemblies frequently reveal incorrect assembly of the wiring-harness connector at the 7-pole positioner connection. This was caused by the cap nut of the wiring-harness plug being fitted at an angle on assembly and thus not being properly screwed on.

This led to inadequate plug-contact overlap and occasional loose contacts. As a consequence, the engine cut-out outlined above is encountered.

Elimination of problem:

The trouble described above can be recognized from a damaged thread at the positioner connection.

In extreme cases there may also be pronounced traces of erosion at contact pins 2 and 7 (adjusting magnet actuation).

When confronted with this complaint, we would therefore request you to carefully check the thread of the 7-pole positioner connection for traces of wiring harness plug having been fitted at an angle before performing any further repair measures.

If signs of incorrect assembly are found, but no contact damage, the thread is to be rendered serviceable (check where applicable with adapter lead KDEP-P 400/3) and continued use is to be made of the fuel-injection pump in the vehicle with correctly installed wiring harness plug.

If, however, there are obvious traces of erosion on the contact pins, the 7-pole positioner connection and possibly also the vehicle-end wiring harness plug are to be replaced. Replacement of positioner connection: Refer to testing and repair instructions, microcard VDT-W 400/019.

#### Important note:

Please advise customers who install fuel-injection pumps themselves of the importance of correct installation of the wiring harness plug and the proper tightening torque of 15 Nm for the cap nut.



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INJECTION PUMPS  
0 400 876 354, -351  
-391, -350, -360, -359  
FOR JOHN DEERE TRACTORS

Workshop: EP  
02.1993  
0362 En

Hard Starting/Surge

Complaints of hard starting on model 644E loader or surging between 1900-2200 ERPM on model 55 row crop tractor may occur. The surge occurs primarily while operating PTO driven implement accessories such as a hay baler, mower conditioner, grain vacuum system and possibly others. Listed are the affected model vehicles with old and new pump part numbers.

Model Vehicle	Old Part Number		
	Bosch	Deere	
Tractor 4055	0 400 876 354	RE36069	
Tractor 4255	0 400 876 351	RE29303	
Tractor 4455	0 400 876 350	RE29182	
Tractor 4755	0 400 876 391	RE47502	
Tractor 4755	0 400 876 360	RE29298	
Loader 644E	0 400 876 359	RE29255	

Model Vehicle	New Part Number		
	Bosch	Deere	
Tractor 4055	0 400 876 398	RE51909	
Tractor 4255	0 400 876 399	RE51910	
Tractor 4455	0 400 876 394	RE51026	
Tractor 4755	0 400 876 400	RE51911	
Tractor 4755	0 400 876 400	RE51911	
Loader 644E	0 400 876 401	RE51912	

Old part number injection pumps may be updated to the new part number by installing the following new parts:

Flyweight	1 428 194 019
Governor Spring	2 424 650 008
Start Spring	1 424 650 063
Rack Cap	1 424 542 003

Torque	Capsule
...398	1 420 506 631
...399	1 420 506 721
...394	1 420 506 664
...400	1 420 506 553
...401	1 420 506 592

When performing this update you must also change the Bosch 10-digit order number and governor alphanumeric designation by restamping the affected digit(s) of the designation.

Restamp designations:

From: 0 400 876 354  
RSV425-1100 A2C 2235L  
To: 0 400 876 398  
RSV425-1100 A0C 2235-2L

From: 0 400 876 351  
RSV425-1100 A2C 2234-1L  
To: 0 400 876 399  
RSV425-1100 A0C 2234-3L

From: 0 400 876 350  
RSV425-1100 A2C 2234L  
To: 0 400 876 394  
RSV425-1100 A0C 2234-2L

Restamp designations:

From: 0 400 876 391  
RSV425-1100 A2C 2225-5L  
To: 0 400 876 400  
RSV425-1100 A0C 2225-6L

From: 0 400 876 360  
RSV425-1100 A2C 2225L  
To: 0 400 876 400  
RSV425-1100 A0C 2225-6L

From: 0 400 876 359  
RSV400-1100 A2C 2204-2L  
To: 0 400 876 401  
RSV425-1100 A0C 2204-9L

All updates, whether in or out of the Bosch warranty are to be performed on a charge basis to the customer.

ROBERT BOSCH Corporation  
Service Department  
Automotive & Diesel Products  
(UA/ASV)

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BOSCH FUEL- Motor vehicle: FZD  
INJECTION PUMP and workshop: EP  
SIZE "R" FOR VOLVO COMMERCIAL 02.1993  
VEHICLE F16 WITH ENGINE TD 163 0363 En

## Service procedure

### INTRODUCTION

The range of Bosch in-line pumps was extended to include a further type in 11.91.

This is the size R.

Type designation:

PE 6 R 120/720 RS 1502

Bosch Part No.: 0 401 496 001.

The R-pump is used in combination with an electronic positioner (RE 31) as already familiar from the well-known EDC in-line pump systems (RE 24 with P...S 3000 and RE 30 with P..." 7000).

The first customer to use this pump is Volvo, Sweden.

The pump is utilized in the F16 vehicle with TD 163 engine. An alternative service concept for this pump was agreed upon with Volvo and is described in the following.

## WARRANTY HANDLING

With the consent of Volvo, Sweden the warranty for Bosch fuel-injection pumps in Volvo trucks is handled via the Bosch Service Organization. This principle likewise applies to the R-pump.

On account of the relatively limited distribution of this new fuel-injection pump to date, there will be no comprehensive service potential for the time being at Bosch Service Stations for individual pump testing and repair work.

Instead, customers are provided in the event of a complaint with a replacement pump free of charge via the Bosch Service Station concerned. The costs of express delivery are likewise not to be billed to customers (secondary warranty costs).

The Bosch Service Station is then credited in the normal manner.



Size "R" Bosch in-line pumps about which complaints are received are to be sent until further notice to:

- \* In Germany with warranty slip G20:

Robert Bosch GmbH  
PW/ALP6 Auspackraum Bau 673/1  
z.W. an K5/QSG1  
Am Boschwerk  
D-7000 Stuttgart 30

- \* In all other countries:  
With warranty slip G21 to the appropriate Bosch local representative for forwarding to K5/QSG1.

Pumps submitted are examined by Bosch. Bosch Service Stations in Germany receive an examination report from K5/QSG1; the local representative is responsible for this action in all other countries.

As agreed upon with our customer, namely the Volvo Truck Corporation, we would ask you to observe the following prior to pump replacement in a warranty situation:

Should complaints be received regarding fuel consumption and/or lack of power, the vehicle must be thoroughly checked in line with Volvo Service Instructions.

Use is to be made for this purpose of the "Volvo Truck Record for Performance Testing".

Prior to cost-free handover of the R-pump to the customer, this Volvo record is to be filled out by and taken from the customer and kept together with the warranty slip. The usual intervals apply as regards the length of time for which the above are to be kept.

We should like to take this opportunity of reiterating that injectors are not to be cleaned with steel brushes. This deforms the holes and alters the flow rates such that complaints may be received regarding performance, consumption and smoke.

Replacement of the injectors could eliminate the grounds for complaint in such circumstances. Replacing the fuel-injection pump in such a situation would not provide a remedy.

These service instructions also apply appropriately to pump replacement for other customers and must be observed.

#### HANDLING OUTSIDE WARRANTY PERIOD

Handling outside the warranty period is currently being coordinated with our customer.

**IMPORTANT:**

R-pump service is to be given special priority since Volvo has likewise given its customers a mobility guarantee. This is especially true of the F16 vehicle.

Bosch Service Stations should therefore order R-pumps where necessary in the usual manner employing express delivery and making reference to the fact that the order relates to an "urgent service situation". All employees responsible for diesel service and spares management at Bosch Service Stations are to be informed accordingly of the above.

Bosch Diesel Service Stations are requested to offer their services to their Volvo representative and to ensure mutual coordination.

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Division KH  
Technical After-Sales Service  
(KH/VKD 2)

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MW FUEL-INJECTION PUMPS  
AS OF VERSION  
CODE ..S 1510

001.93 En  
02.1993

## Instructions on how to set prestroke

This Service Info is designed to supplement the test instructions for MW fuel-injection pumps on microcard W-400/009.

MW fuel-injection pumps as of version code ..S 1510 feature a camshaft with a longer stroke (12 mm).  
On account of further design modifications to engine components the camshaft is *n o t* to be turned through 360 Grad when adjusting prestroke with prestroke measuring device fitted.  
After setting the prestroke at no. 1 cylinder with prestroke measuring device, the measuring device *m u s t* be removed prior to subsequent measurement of the angular cam spacing.

If the above is not observed,  
the measuring-device drive and  
parts of the fuel-injection pump  
will be damaged.  
Subsequent damage cannot be precluded  
if use is made of a predamaged  
fuel-injection pump.

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MERCEDES-BENZ  
ENGINES WITH  
P-PUMP AND  
TWO-STAGE LDA

Motor vehicle: FZD  
and Workshop: EP  
02.1993  
0347 En

Poor performance

OM 402 LA

Complaints may be received about the power output/fuel consumption of these engines which produce 280 kW at 2100 1/min or 1900 1/min.

If, after the engine has been tested by a MERCEDES-BENZ service station and the injection-pump assembly has been tested/readjusted, poor performance is still registered, the following procedure is to be implemented:

1. Block spring retainer of 2nd stage of LDA by turning three revolutions.
2. Replace LDA spring of 1st stage with spring 2 424 619 088.
3. Set injection-pump assembly to values indicated in following table.

4. Check and, if applicable, adjust start of delivery to 9.0° before OT.

The following injection-pump assemblies are affected

0 402 648 893  
0 402 648 894  
0 402 648 895 and  
0 402 648 914.

The following test specifications initially apply:

n 1/min	CRT mm	Pressure hPa	Delivery ccm/1000s
800	14.7 to 14.9	1500	234.0 to 238.0
950 or 1050	as in test specification		
500	10.2 to 10.5	0	134.0 to 136.0

The injection-pump assembly is to be removed prior to conversion.



## 5. LDA start of advance

The start of advance of the LDA is to be set at 500 1/min. The increase in control-rod travel is 0.1...0.3 mm at 175 hPa.

The end of advance is reached at 875 hPa.

## OM 442 A

Complaints may be received about the power output and fuel consumption of these engines which produce 250 kW at 2100 1/min. The following procedure is to be adopted if poor performance is still registered after the engine has been tested by a MERCEDES-BENZ service station and the injection-pump assembly has been tested/readjusted:

1. Block spring retainer of 2nd stage of LDA by turning three revolutions.

2. Replace LDA spring of 1st stage with spring 2 424 619 104.
3. Set injection-pump assembly to values given in following table.
4. Check and, if applicable, adjust start of delivery to 6.0° before OT.

The following injection-pump assemblies are affected

0 402 648 900  
0 402 648 901

The following test specifications initially apply:

n 1/min	CRT mm	Pressure hPa	Delivery ccm/1000S
1050		1200	193.0 to 195.0
600		1200	209.0 to 212.0
500		0	138.0 to 140.0

The injection-pump assembly is to be removed prior to conversion.

## 5. LDA start of advance

The start of advance of the LDA is to be set at 500 1/min. The increase in control-rod travel is 0.1...0.3 mm at 225 hPa.

## OM 442 A

Complaints may be received about the power output and fuel consumption of these engines which produce 250 kW at 1900 1/min. The following procedure is to be adopted if poor performance is still registered after the engine has been tested by a MERCEDES-BENZ service station and the injection-pump assembly has been tested/readjusted:

1. Block spring retainer of 2nd stage of LDA by turning three revolutions.

2. Replace LDA spring of 1st stage with spring 2 424 619 104.

3. Set injection-pump assembly to values given in following table.

4. Check and, if applicable, adjust start of delivery to 6.0° before OT.

The following injection-pump assemblies are affected

0 402 648 909

0 402 648 910

The following test specifications initially apply:

n 1/min	CRT mm	Pressure hPa	Delivery ccm/1000S
950		1200	207.0 to 209.0
600		1200	209.0 to 212.0
500		0	138.0 to 140.0

The injection-pump assembly is to be removed prior to conversion.

#### 4. LDA start of advance

The start of advance of the LDA is to be set at 600 1/min. The increase in control-rod travel is 0.1...0.3 mm at 225 hPa.

#### OM 401 LA

Complaints may be received about the power output and fuel consumption of these engines which produce 230 kW at 1900 1/min. The following procedure is to be adopted if poor performance is still registered after the engine has been tested by a MERCEDES-BENZ service station and the injection-pump assembly has been tested/readjusted:

1. Block spring retainer of 2nd stage of LDA by turning three revolutions.

2. Check and, if applicable, set start of delivery to 9.0° before OT.

3. Set injection-pump assembly to values given in following table.

The following test specifications initially apply to the injection-pump assemblies 0 402 646 917 and 0 402 646 926:

n 1/min	CRT mm	Pressure hPa	Delivery ccm/1000S
950		1100	236.0 to 239.0
600		1100	240.0 to 242.0
500		0	134.0 to 136.0

The following test specifications initially apply to the injection-pump assemblies 0 402 646 953 and 0 402 646 958:

n 1/min	CRT mm	Pressure hPa	Delivery ccm/1000S
950		1200	187.0 to 190.0
800		1200	132.0 to 134.0
500		0	132.0 to 134.0

The injection-pump assembly is to be removed prior to conversion.

#### 4. LDA start of advance

The start of advance of the LDA is to be set at 500 1/min to 130...150 hPa. The increase in control-rod travel is 0.1...0.3 mm at 190 hPa.

Complaints may be received about the power output and fuel consumption of these engines which produce 230 kW at 2100 1/min. The following procedure is to be adopted if poor performance is still registered after the engine has been tested by a MERCEDES-BENZ service station and the injection-pump assembly has been tested/readjusted:

1. Block spring retainer of 2nd stage of LDA by turning three revolutions.

2. Check and, if applicable, set start of delivery to 9.0° before OT.

3. Set injection-pump assembly to values given in following table.



The following test specifications initially apply to the injection-pump assemblies 0 402 646 930 and 0 402 646 929:

n 1/min	CRT mm	Pressure hPa	Delivery ccm/1000S
1050		1100	234.0 to 237.0
600		1100	240.0 to 242.0
500		0	134.0 to 136.0

The following test specifications initially apply to the injection-pump assemblies 0 402 646 952 and 0 402 646 957:

n 1/min	CRT mm	Pressure hPa	Delivery ccm/1000S
1050		1200	182.0 to 185.0
800		1200	186.0 to 190.0
500		0	132.0 to 134.0

The injection-pump assembly is to be removed prior to conversion.

#### 4. LDA start of advance

The start of advance of the LDA is to be set at 500 1/min to 130...150 hPa. The increase in control-rod travel is 0.1...0.3 mm at 190 hPa.

#### OM 401 LA

Complaints may be received about the power output and fuel consumption of these engines which produce 200 kW at 1900 1/min. The following procedure is to be adopted if poor performance is still registered after the engine has been tested by a MERCEDES-BENZ service station and the injection-pump assembly has been tested/readjusted:

1. Block spring retainer of 2nd stage of LDA by turning three revolutions.

2. Check and, if applicable, set start of delivery to 9.0° before OT.

3. Set injection-pump assembly to values given in following table.

The following test specifications initially apply to the injection-pump assemblies 0 402 646 939 and 0 402 646 940:

n 1/min	CRT mm	Pressure hPa	Delivery ccm/1000S
950		1200	203.0 to 206.0
800		1200	202.0 to 206.0
500		0	132.0 to 134.0

The injection-pump assembly is to be removed prior to conversion.

#### 4. LDA start of advance

The start of advance of the LDA is to be set at 500 1/min to 130...150 hPa. The increase in control-rod travel is 0.1...0.3 mm at 190 hPa.

#### OM 401 LA

Complaints may be received about the power output and fuel consumption of these engines which produce 200 kW at 2100 1/min. The following procedure is to be adopted if poor performance is still registered after the engine has been tested by a MERCEDES-BENZ service station and the injection-pump assembly has been tested/readjusted:

1. Block spring retainer of 2nd stage of LDA by turning three revolutions.

2. Check and, if applicable, set start of delivery to 9.0° before OT.

3. Set injection-pump assembly to values given in following table.

The following test specifications initially apply to the injection-pump assemblies 0 402 646 915 and 0 402 646 916:

n 1/min	CRT mm	Pressure hPa	Delivery ccm/1000S
1050		1200	201.0 to 204.0
600		1200	202.0 to 206.0
500		0	132.0 to 134.0

The injection-pump assembly is to be removed prior to conversion.

#### 4. LDA start of advance

The start of advance of the LDA is to be set at 500 1/min to 130...150 hPa. The increase in control-rod travel is 0.1...0.3 mm at 190 hPa.

#### OM 441 LA

Complaints may be received about the power output and fuel consumption of these engines which produce 250 kW at 1900 1/min. The following procedure is to be adopted if poor performance is still registered after the engine has been tested by a MERCEDES-BENZ service station and the injection-pump assembly has been tested/readjusted:

1. Block spring retainer of 2nd stage of LDA by turning three revolutions.

2. Check and, if applicable, set start of delivery to 9.0° before OT.

3. Set injection-pump assembly to values given in following table.

The following test specifications initially apply to the injection-pump assemblies 0 402 646 924 and 0 402 646 925:

n 1/min	CRT mm	Pressure hPa	Delivery ccm/1000S
950		1200	251.0 to 254.0
800		1200	250.0 to 254.0
500		0	135.0 to 137.0

The injection-pump assembly is to be removed prior to conversion.

#### 4. LDA start of advance

The start of advance of the LDA is to be set at 500 1/min to 130...150 hPa. The increase in control-rod travel is 0.1...0.3 mm at 190 hPa.

#### OM 401 LA

Complaints may be received about the power output and fuel consumption of these engines which produce 200 kW at 2100 1/min. The following procedure is to be adopted if poor performance is still registered after the engine has been tested by a MERCEDES-BENZ service station and the injection-pump assembly has been tested/readjusted:

1. Block spring retainer of 2nd stage of LDA by turning three revolutions.



2. Check and, if applicable, set start of delivery to 9.0° before OT.

3. Set injection-pump assembly to values given in following table.

The following test specifications initially apply to the injection-pump assemblies 0 402 646 921 and 0 402 646 931:

n 1/min	CRT mm	Pressure hPa	Delivery ccm/1000S
1050		1200	235.0 to 238.0
800		1200	248.0 to 252.0
500		0	132.0 to 134.0

The injection-pump assembly is to be removed prior to conversion.

#### 4. LDA start of advance

The start of advance of the LDA is to be set at 500 1/min to 130...150 hPa. The increase in control-rod travel is 0.1...0.3 mm at 190 hPa.

#### OM 442 LA

Complaints may be received about the power output and fuel consumption of these engines which produce 320 kW at 1900 1/min. The following procedure is to be adopted if poor performance is still registered after the engine has been tested by a MERCEDES-BENZ service station and the injection-pump assembly has been tested/readjusted:

1. Block spring retainer of 2nd stage of LDA by turning three revolutions.

2. Check and, if applicable, set start of delivery to 9.0° before OT.

3. Set injection-pump assembly to values given in following table.

The following test specifications initially apply to the injection-pump assemblies 0 402 648 898 and 0 402 648 908:

n 1/min	CRT mm	Pressure hPa	Delivery ccm/1000S
950		1200	234.0 to 237.0
800		1200	243.0 to 247.0
500		0	138.0 to 140.0

The injection-pump assembly is to be removed prior to conversion.

#### 4. LDA start of advance

The start of advance of the LDA is to be set at 500 1/min to 130...150 hPa. The increase in control-rod travel is 0.1...0.3 mm at 190 hPa.

#### OM 442 LA

Complaints may be received about the power output and fuel consumption of these engines which produce 232 kW at 2100 1/min. The following procedure is to be adopted if poor performance is still registered after the engine has been tested by a MERCEDES-BENZ service station and the injection-pump assembly has been tested/readjusted:

1. Block spring retainer of 2nd stage of LDA by turning three revolutions.

2. Check and, if applicable, set start of delivery to 9.0° before OT.

3. Set injection-pump assembly to values given in following table.

The following test specifications initially apply to the injection-pump assemblies 0 402 648 906 and 0 402 648 908:

n 1/min	CRT mm	Pressure hPa	Delivery ccm/1000S
1050		1200	226.0 to 229.0
600		1200	239.0 to 242.0
500		0	135.0 to 137.0

The injection-pump assembly is to be removed prior to conversion.

#### 4. LDA start of advance

The start of advance of the LDA is to be set at 500 1/min to 130...150 hPa. The increase in control-rod travel is 0.1...0.3 mm at 190 hPa.

Calibrating nozzle-holder assembly and test-pressure line are to be taken in each case from the test specifications for the starting assembly on microcard WP..

Test specifications and service-parts lists for these converted injection-pump assemblies (variants) are being gradually published on microcard WP../EP.. in line with the basic-pump concept (refer to Service Info).

#### Important:

Following conversion, "X" is to be marked on the nameplate of the fuel-injection pump behind the assembly part number.

The conversion work does not affect the homologation for the vehicles concerned.

The costs of the conversion work are to be billed.

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Division KH  
After-Sales-Service Department for  
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IN-LINE PUMPS  
OF ALL SIZES

Workshop: EP  
02.1993  
0364 En

Prestroke and start-of-delivery setting

On account of new findings and a new adjustment method at the manufacturing plant a new procedure has been established by the development department for the measurement and adjustment of the prestroke and angular cam spacing on in-line pumps. This differs in part from the procedure to date and is specified in the following in binding form.

1. The plunger-and-barrel assembly for setting the prestroke is always stated first in the cam sequence, e.g.

1 - 3 - 4 - 2 or 5 - 1 - 3 - 4 - 2.

The start-of-delivery setting of the pump plunger has been reached when the flow of calibrating oil becomes droplets at the overflow pipe of the test nozzle holder assembly (as before). This must occur within the prescribed tolerances; otherwise the prestroke is to be adjusted as before.

2. Following this adjustment, the pump plunger of the plunger-and-barrel assembly is to be set to the mean value of the prestroke given in the test specification.



Example: Prestroke = 3.10...3.20 mm results in pump plunger position of 3.15 mm. Once this stroke has been attained, the pointer of the degrees scale on the inertia flywheel of the injection-pump test bench is to be set to "0". In view of the fact that the scale ring on the inertia flywheel of the injection-pump test bench cannot be turned to "0", the resultant 0 position is to be noted down. This position represents the starting position for measurement of the angular cam spacing; thus for example 60 - 120 - 180° etc. and not 60° in each case as was usual. This is likewise so specified in the test specifications.

This measurement method makes for more precise determination/setting of the prestroke of the remaining plunger-and-barrel assemblies and thus enhances running behavior and the fuel consumption of the engine to which the injection-pump assembly is attached.

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CONVERSION OF CALIBRATING Workshop: EP  
NOZZLE-HOLDER ASSEMBLY 06.1993  
TYPE VII TO TYPE VIII 0365 En

The type VIII calibrating nozzle-holder assembly is required for M-pumps in Mercedes-Benz vehicles when checking the IP.

Important:

As a general rule it is not possible to effect conversion to a different type category.

Conversion from type VII to type VIII is an exception.

Example:

Conversion of type VII to type VIII

Type VII	Type VIII
1 688 901 101	1 688 901 111 or
1 688 901 102	1 688 901 112
1 688 901 103	1 688 901 113
1 688 901 104	
1 688 901 105	
1 688 901 106	
1 688 901 109	
1 688 901 110	

The following components are required  
for conversion:

* Spacer bushing	1 680 300 210
* Test nozzle	1 688 901 988

Following conversion, the respective  
opening pressure must be set on the  
calibrating nozzle-holder assembly,  
e.g. type VIII:

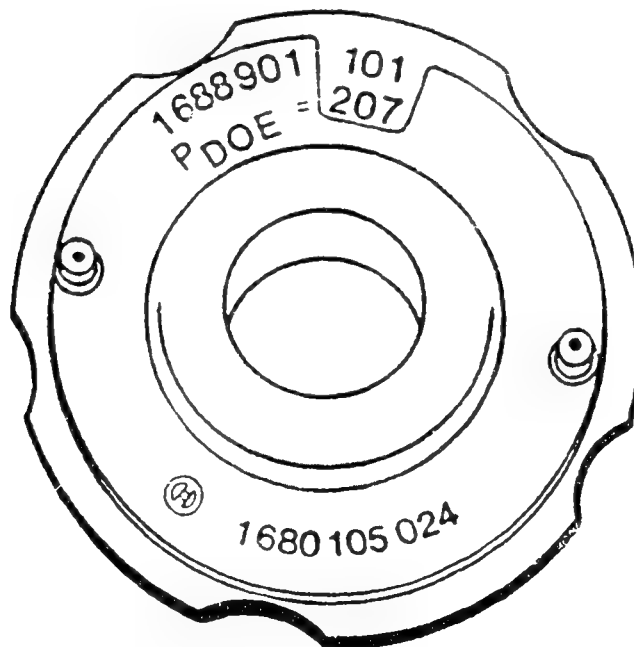
1 688 901 111	—>	147 bar
1 688 901 112	—>	172 bar
1 688 901 113	—>	207 bar

**Note:**

The designation plate 1 680 105 024 is available from IA4 for marking the respective calibrating nozzle-holder assembly version.

This is placed over the holder fitting and automatically indicates the set opening pressure after adjusting the respective version.

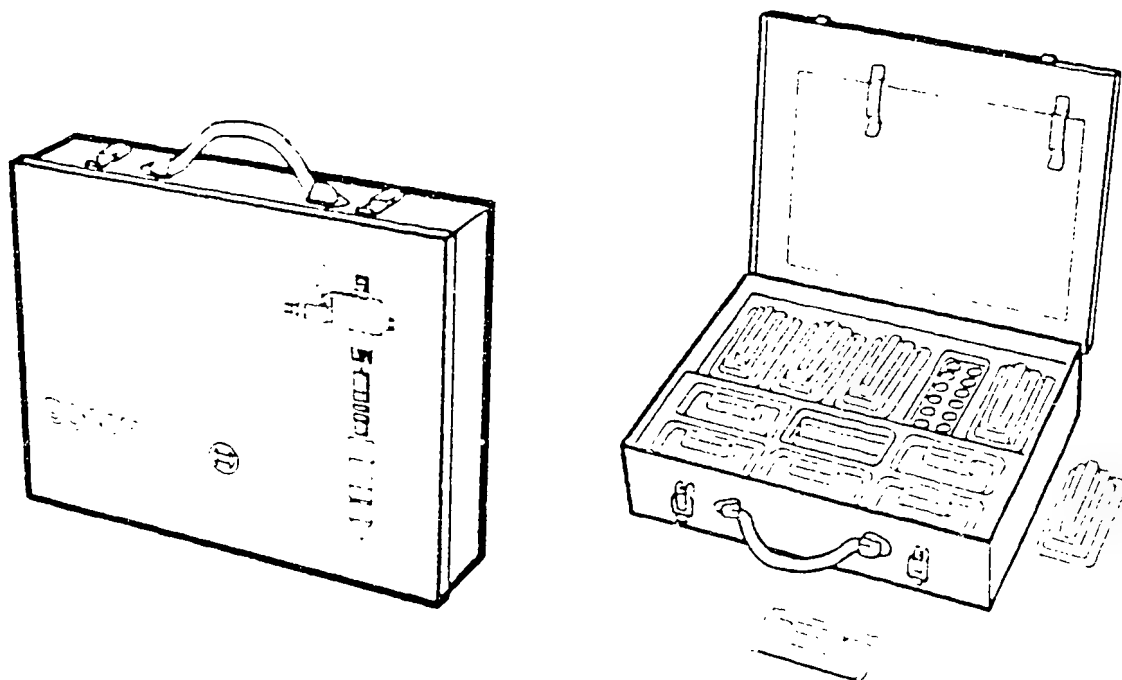
KMK 03883



The case 1 685 438 105 is intended for accommodating perforated plates, spacer bushings and calibrating nozzles.

The case comes without contents and can be provided with the necessary conversion components for calibrating nozzle-holder assemblies by Bosch Service.

KMK 03884



Recommendation:

It is only appropriate to convert the calibrating nozzle-holder assemblies to other versions if they are used very infrequently.

Frequent conversion has a long-term negative effect on the quality of the calibrating nozzle-holder assemblies and also requires a great deal of time.

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VE (DI)  
FUEL-INJECTION PUMPS

Workshop: EP  
06.1993  
0367 En

Shutoff problems

Pumps affected:

0 460 414 083  
0 460 414 085  
0 460 414 086  
0 460 414 069  
0 460 414 080  
0 460 414 093

Shutoff problems can be caused by an accumulation of chips at the ELAB due to a faulty cam plate.

If this is the case

- 1) disassemble and clean fuel-injection pump
- 2) renew cam plate and roller ring.

Goodwill 1 year or up to

max. 100 000 km

for VE with date of manufacture 168 to 263 (8.91 to 3.92)

This complaint is to be reported in the warranty claim with fault no. 68 as per fault-no. list.



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COMMERCIAL VEHICLES Motor vehicle: FZD  
WITH EDC and workshop : EP  
PE..P..WITH RE24/30 06.1993  
0368 En

Contact fault in RE-positioner  
Fault indication by self-diagnosis

Complaints:

- \* Vehicle occasionally cuts out,  
self-diagnosis signals fault  
"Control-rod-travel sensor defective"  
or "Permanent deviation".
- \* Self-diagnosis signals fault  
"Engine-speed sensor defective"
- \* Poor engine performance without  
fault detection by self-diagnosis.

Cause of trouble:

Cutting out of the engine in conjunction with the faults "Control-rod-travel sensor defective" or "Permanent deviation" is a function of the EDC safety system.

The fault "Engine-speed sensor defective" causes the safety system to reduce power with certain types of vehicle.

Poor engine performance (e.g. vibration or loss of power) may however also be encountered without fault recognition by the self-diagnosis. Such faults may be due both to the vehicle EDC system and to the RE-positioner.

## Fault determination and elimination:

Should one of the listed faults occur, the first step should always be to check the EDC system in the vehicle, paying particular attention to loose contacts, loose and incorrectly fitted or corroded connections.

If this test does not reveal any faults, remove the fuel-injection pump and disassemble the positioner cover for testing.

Checking of the components installed in the positioner cover is initially to be performed as described in the repair and testing instructions for RE-positioners VDT-W 400/019.

As an additional measure the soldering-eye crimps of the control-rod-travel and wheel-speed-sensor leads are to be subjected to a visual inspection.

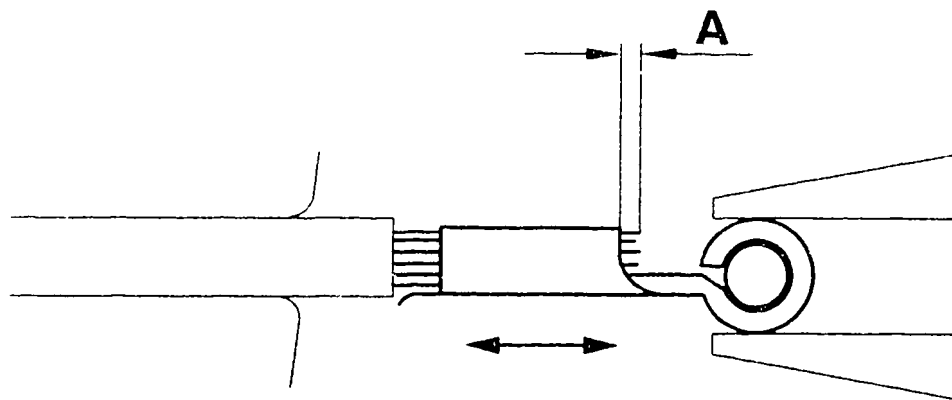
Investigations have shown that the crimps do not always have the prescribed strength and that this may lead after a certain time to poor contact (loose contact).

Pay attention to the information given in the following when performing visual inspection of crimps:

Visual assessment requires the use of an illuminated magnifier (min. 6x magnification, e.g. Bosch 1 687 600 005) or a workshop microscope (min. 10x magnification).

- \* Place positioner cover on suitable mount.
- \* Unscrew cover of 7-pole connection plate.
- \* Wipe off residual oil around crimp.
- \* Lift each individual lead of control-rod-travel sensor and engine-speed sensor out of cable duct, move it back and forth in stranded wire direction using pointed pliers or tweezers and inspect crimp under magnifier/microscope. Take care not to kink leads.

KMK04056

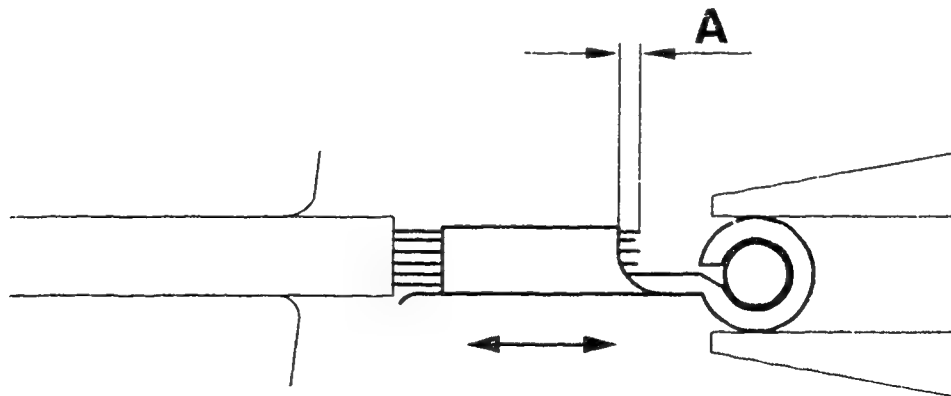


### Crimp assessment:

- \* There should be no change in the length of the protruding end of the stranded wire (dimension A, see picture) on moving the lead.
- \* The crimp is defective if there is even minimal relative movement between end of stranded wire and crimp.

Note: The distance between crimp and lead insulation is not suitable for assessment purposes on account of the flexibility of the insulation.

KMK04056

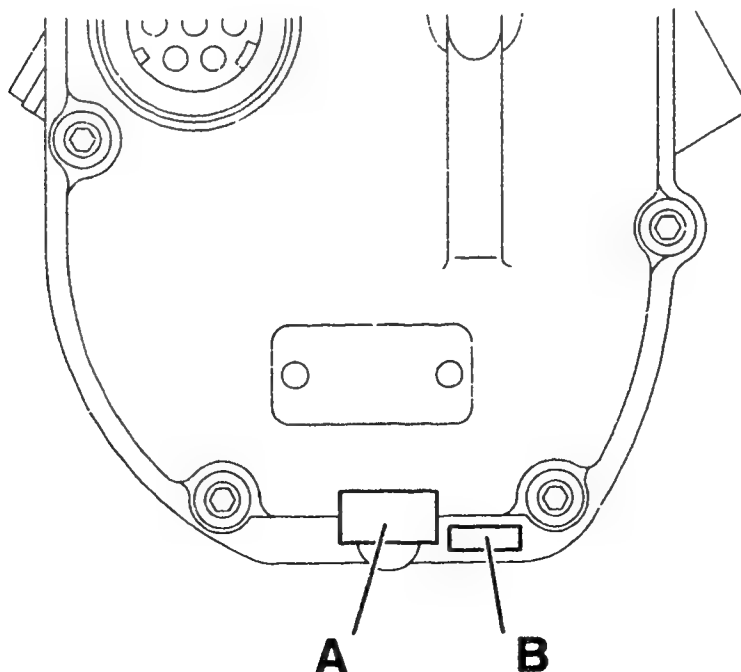


If a crimp is loose the appropriate component (control-rod-travel or engine-speed sensor) is to be replaced. Pay attention to the detailed specifications in the repair and testing instructions VDT-W-400/019.

Note: All positioners from the start of series production up to date of manufacture 266 and no. 158 may be affected by faulty crimps. Proper ex-works crimping is ensured with newer positioners.

A = Date of manufacture  
B = Number

KMK04057



Note: New part no. for control-  
rod-travel sensor:

The part no. has been altered as  
follows:

Old: 3 427 224 103

New: 2 427 224 001

The appropriate new version is  
supplied automatically if the old  
part no. is used when ordering.

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QUICK  
LOCATION OF NEW  
SERVICE INFO  
ON MICROCARDS

003.93 En  
09.1993

Service Info has been exclusively published on microcards since mid-1991. There is no longer a hard copy.

We are often asked where the latest Service Info is to be found, and on which microcards.

The latest Service Info always comes at the end of a given microcard so as to make for a rapid overview of the most important new features as required.

Microcards featuring Service Info are marked with an \* on the record list.

Listed in the following for your reference are the current Service Info microcards which will be distributed as and where necessary:



Assembly shops

1. FZG-001 Information from and for Bosch Service Stations
2. FZD-025 Passenger and commercial-vehicle info (Diesel only)
3. KFZ-015 Info concerning both passenger and commercial vehicles (not brakes and Diesel)
4. PKB-026 Brake-system info incl. ABS for passenger and commercial vehicles
5. NKW-008 Info exclusively for commercial vehicles (not brakes and Diesel)

Assembly shops

6. PKW- 160 Info exclusively for passenger vehicles (not brakes and Diesel)
7. PKW-5001 Info exclusively for passenger vehicles with mixed and non-Bosch systems (not brakes and Diesel)

## Repair shops

- 8. W-001/020 EL workshop info
- 9. W-400/040 EP workshop info
- 10. W-480/005 NB workshop info

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COMM. VEH. WITH EDC  
PE...P... WITH RE 30

004.93 En  
09.1993

## IDLE INSTABILITY

### Complaint:

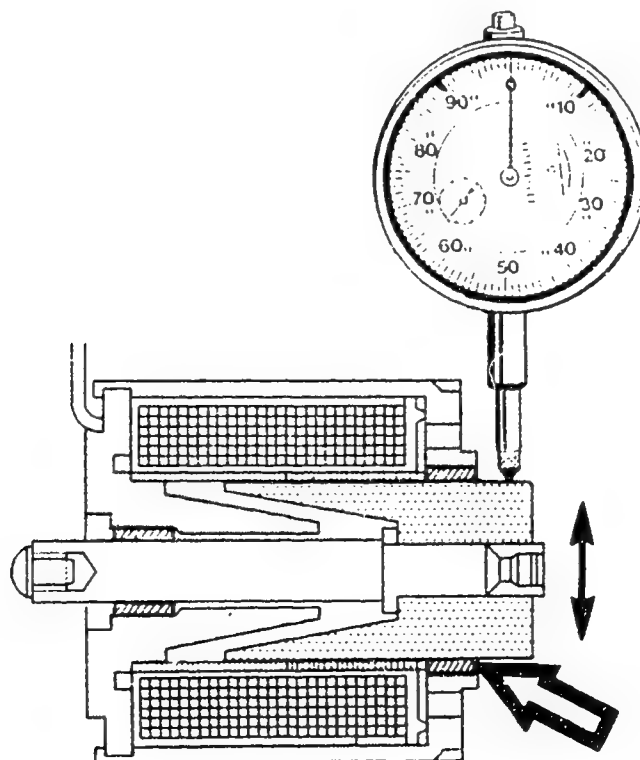
Commercial vehicles with EDC system (P-pump with RE-positioner) may be subject to unstable control behaviour in the idle and intermediate speed ranges. With this complaint, the self-diagnosis may indicate the fault "Permanent deviation".

Vehicles from all model years since the start of series production in 1989 may be affected.

## Cause of trouble:

This complaint may be due to a stiff armature in the RE-positioner solenoid resulting from (usually one-sided) wear of the large armature bushing (picture, arrow).

Normal testing of the IP assembly on an IP test bench does not reveal such wear. When confronted with the above complaint, the solenoid is therefore to be removed and the bearing wear measured.

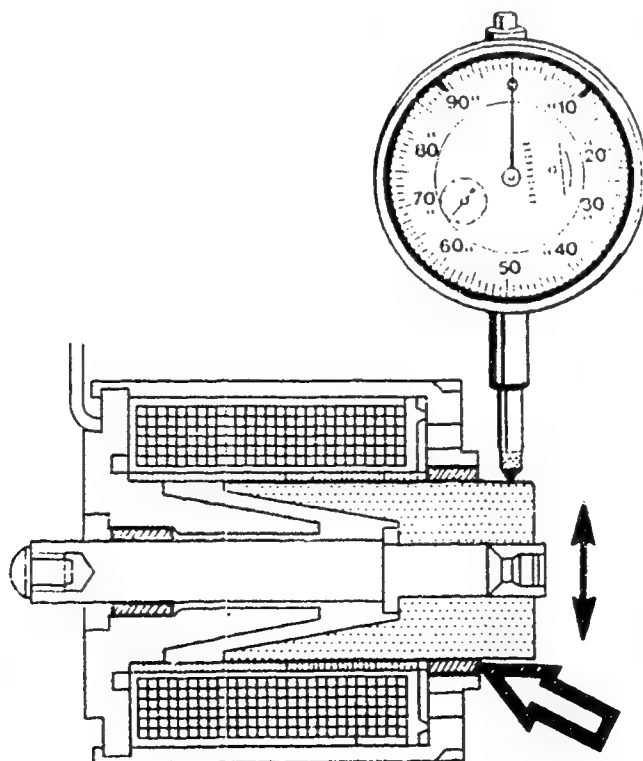


KMK 03078

## Fault determination and correction:

The following work is based on the repair and test instructions for RE positioners VDT-W-400/019, the information in which is to be precisely followed.

- Completely remove positioner cover.
- Unsolder electrical connections of control-rod-travel sensor and adjusting magnet at connection plate (pay attention to soldering specifications).
- Remove control-rod-travel sensor and adjusting magnet.
- Check large bushing in adjusting magnet (arrow) for wear.



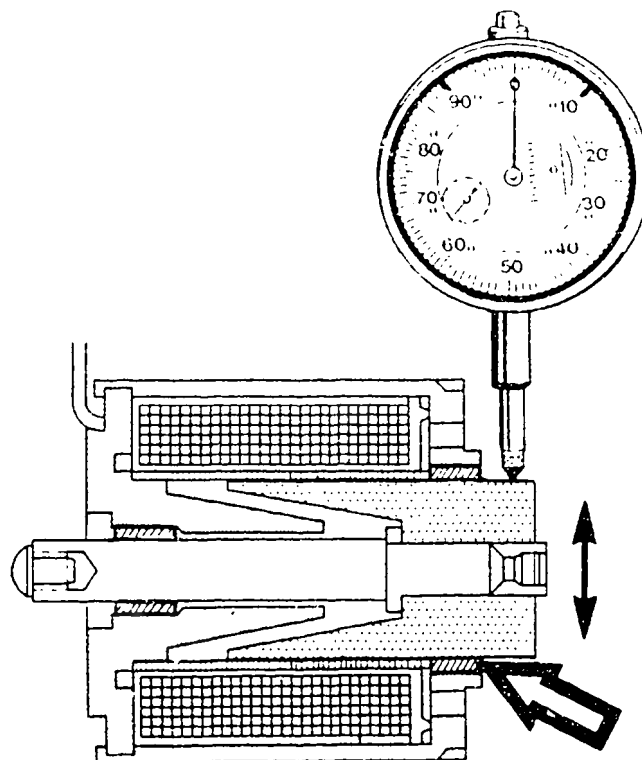
KMK 03078

## Checking bearing clearance:

### Tools required:

- Prism for holding adjusting magnet
- Stand, commercially available,  
e. g. Bosch 4 851 601 124
- Dial indicator, 0.01 mm  
graduations, commercially available,  
e.g.. Bosch 1 687 233 011

Procedure: Place magnet in prism.  
Pull electromagnet armature somewhat  
out of housing and align dial  
indicator at armature directly  
adjacent to large bushing. Move  
armature in vertical direction within  
bearing clearance; in doing so, turn  
magnet in prism to several positions  
and establish maximum bearing  
clearance.



KMK 03078

The clearance for the large bushing must not exceed 0.15 mm.

The solenoid is to be renewed if the limit value is exceeded (as of 0.16 mm bearing clearance). The repair instructions are to be used for the installation of solenoid and CRT sensor as well as for positioner assembly.

Important: Applies to reusable and new solenoids: clean armature and armature bore (dry) and lubricate thoroughly with SAE 20 W 20 oil prior to installation.

Place injection pump on IP test bench. Set CRT sensor as per test instructions and check/adjust pump.

#### Warranty:

If a defective solenoid is found to be the cause of the complaint described above, the usual warranty periods apply insofar as special stipulations have not been made on the basis of a separate bulletin.

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0 402 196 701  
Drive Hub / Locked Timing

Workshop: EP  
09.1993  
0372 En

John Deere Tractors

The subject injection pump combination  
as installed on tractors with tractor  
serial number

from RW8760H, P or S 4322

to RW8760H, P or S 4736

must have the timing mark changed. The  
drive hub must also be inspected and,  
if necessary, replaced. J. Deere will  
notify the owners of the affected  
vehicles to arrange injection pump  
removal and subsequent service.

Upon receipt of the injection pump as-  
sembly, inspect the small piloting di-  
meter of the drive hub for any defor-  
mation of metal which would not allow  
the drive gear to be properly installed  
and seat on the hub. In cases of mate-  
rial deformation the removal of the  
drive gear is difficult. When evidence  
of deformation is present, verify the  
difficulty of drive gear removal with  
the J. Deere dealer. In such cases  
the existing drive hub must be  
replaced with a new one, part number  
2 416 434 103, and torqued to  
150 + 10 Nm.

Replacement drive hubs and drive hubs without any material deformation must have the timing mark set to the new specifications in the next paragraph.

To improve performance and fuel consumption, the locked timing and mark of 8.5 degrees after LPC of cylinder #1 must be changed to 10 degrees after LPC cylinder #1. It should not be necessary to scribe a new timing mark. Instead, loosen the timing pointer and establish actual LPC. "Zero" the degree wheel and rotate hub to 10 degrees after LPC. Realign the existing timing marks and retighten the timing pointer.

If the timing pointer can not be shifted sufficiently to gain the 1-1/2 degree change, center the pointer and lock in place, perform LPC measurement and per standard procedures scribe a new timing mark on the hub. Be sure to obliterate the old mark. The test specification will be updated to reflect this change.

The timing change from 8.5 degrees to 10.0 degrees is at the request of J. Deere and you should invoice the J. Deere dealer 1.0 hour labor for performing the change in timing.

This 1.0 hour labor charge is not applicable in cases of drive hub replacements. Drive hub replacements are covered under the standard Bosch warranty and should be reported via the normal warranty channel. You will be reimbursed 1.5 hours plus parts.

In addition to the standard information required, you must indicate Vehicle Identification Number and Engine Serial Number. Omission of this information will cause unnecessary delay in processing of your claim.

ROBERT BOSCH Corporation  
Service Department  
Automotive & Diesel Products  
(UA/ASV)

Please direct questions and comments concerning the contents to our authorized representative in your country

FUEL-INJECTION PUMP    Motor vehicle: NKW  
PES 6 P 120 A                      and workshop: EP  
720 RS 7224                              12.1993  
IN IVECO TRUCKS E30/E34                      0375 En

Cold starting problems

At low temperatures the engine may not start or only with difficulty.

Cause: Control rod does not move to start position since sensing lever in mechanical governor stuck on full load stop.

Refers to:

Unit        : 0 402 746 901  
Pump        : PES 6 P 120 A 720 RS 7224  
Governor: RQV 275...1100 PA 975 K  
Engine     : 8460.41.406

and

Unit        : 0 402 746 902  
Pump        : PES 6 P 120 A 720 RS 7224  
Governor: RQV 275...1100 PA 975-1K  
Engine     : 8460.41.320

## Remedy

1. Replace full load stop  
(see IP-microcards item 89) on

\* Assembly:       0 402 746 901  
from 2 427 133 778 to 2 427 133 973

\* Assembly:       0 402 746 902  
from 2 427 133 723 to 2 427 133 974

## Remedy (continued)

2. Replace stop lever in LDA  
(see IP-microcards item 106/17)  
on

\* Assembly:       0 402 746 901 and  
                  0 402 746 902  
  
from 2 421 960 076 to 2 421 960 084

## Remedy (continued)

### 3. Shims in flyweight assembly (see IP-microcards item 8/16) on

\* Assembly:        0 402 746 901    and  
                      0 402 746 902

One shim (0.50 mm thick) must be removed on either side beneath the idle spring (outer spring).

Following completion of remedial measure, IP assembly must be reset on IP test bench.

Check following items again after carrying out adjustment:

- \* Start interlock and release
- \* Idle adjustment

IP assemblies as of FD 363 (March 93)  
are n o t affected by this Service  
Info.

Remedial measure is only required in  
the event of a complaint.

If work is performed within warranty  
period, indicate the following on the  
warranty claim:

- \* Fault text: cold start problem
- \* Fault number 40
- \* Enter "X" in column 80 of G20/G21  
voucher

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CHANGE FROM  
STANDARD GUIDE BOLT  
AND S-PLATE DIMENSIONS  
IN MACK RQV-K GOVERNORS

Workshop: EP  
12.1993  
0373 En

It has become necessary to deviate from formerly "standard" guide bolt and S-plate dimensions in some Mack RQV-K governors.

Listed behind are these new dimensions and various pump combinations that require them. Some require changes to guide bolt dimensions only and others require changes to both.

When servicing Mack P-7000 and P-7100 pump combinations refer to this list. Combination numbers lower than those listed use standard dimensions.



Standard guide bolt dimensions:

34.9 mm +/- 0.2 mm

Setting tool: 1 682 329 038

New guide bolt dimensions:

37.1 mm +/- 0.2 mm

Setting tool: 1 682 329 081

Standard S-plate dimensions:

24.5 mm +/- 0.1 mm

Setting tool: 9 681 238 904

New S-plate dimensions:

26.7 mm +/- 0.1 mm

Setting tool: 9 681 238 905

Note: S-plate dimensions are set with  
the governor cover gasket in place.

37.1 mm Guide Bolt and  
24.5 mm S-Plate Dimensions

0 402 746 852

0 402 764 853

0 402 746 866

0 402 746 871

0 402 746 872

0 402 746 873

0 402 746 874

0 402 746 875

0 402 746 876

0 402 764 885

0 402 746 886

0 402 746 887

0 402 746 890

0 402 746 891

0 402 746 892

0 402 746 895

37.1 mm Guide Bolt and  
26.7 mm S-Plate Dimensions

9 400 231 179  
9 400 231 193  
0 402 746 827  
0 402 746 828  
0 402 746 836  
0 402 746 837  
0 402 746 838  
0 402 746 839  
0 402 746 840

0 402 746 842  
0 402 746 861  
0 402 746 862  
0 402 746 869  
0 402 746 888  
0 402 748 801  
0 402 748 802  
0 402 748 803

If setting tools are unavailable,  
refer to SIS microfiche card number  
W-400/011 for instructions on how to  
measure S-plate and guide bolt  
dimensions.

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## IN-LINE PUMPS

Workshop : EP  
12.1993  
0379 En

### Alteration to delivery valve

#### Pumps affected:

- Size P (8000)
- Size P (8500)
- Size R
- Size H

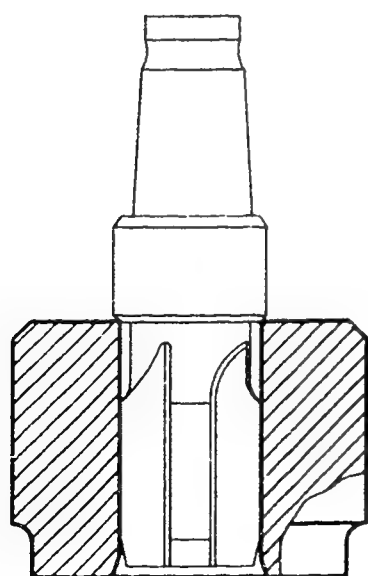
A new barrel-valve holder, which satisfies higher quality requirements, is being installed in the current series (size H up to series launch) of the above-mentioned in-line pumps.

This valve holder will be used with various constant-pressure-valve (GDV) sizes and, under certain circumstances, also with constant-volume valves (GRV).

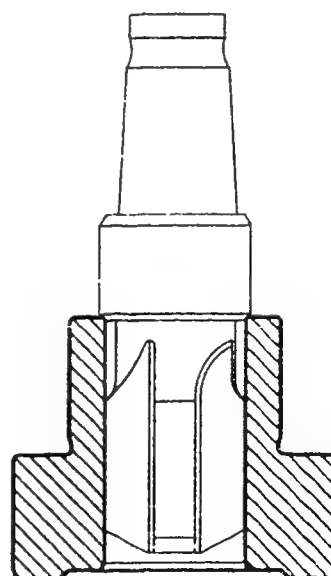
This valve holder is designed to replace the collar-valve holder previously used as standard.

Fig. a = GDV barrel valve

Fig. b = GDV collar valve



a



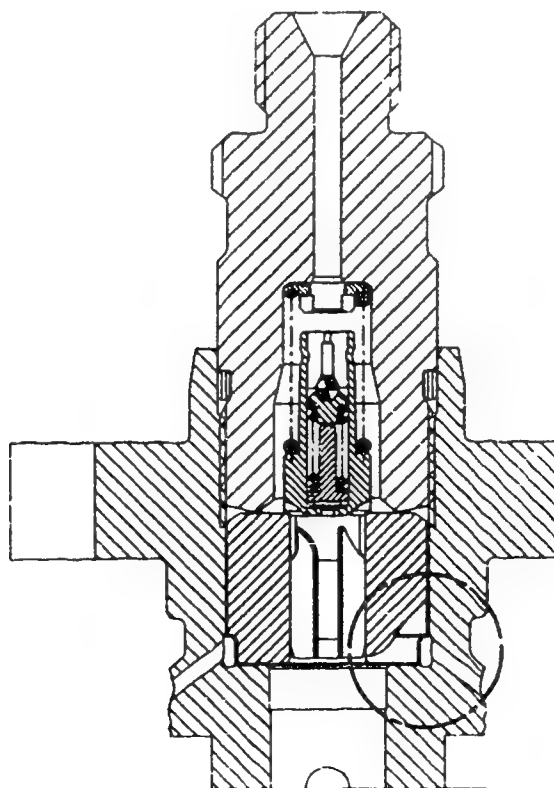
b

KMK04503

When installing the barrel valve it must be ensured that the shoulder on the valve holder faces downwards towards the plunger-and-barrel assembly (picture - circle).

If these assembly instructions are not heeded, the pump setting will always be w r o n g.

The tightening torques and fitting instructions given in the appropriate repair information for the delivery-valve holder are still valid.



KMK04504

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KDEP 1598

Workshop: EP

12.1993

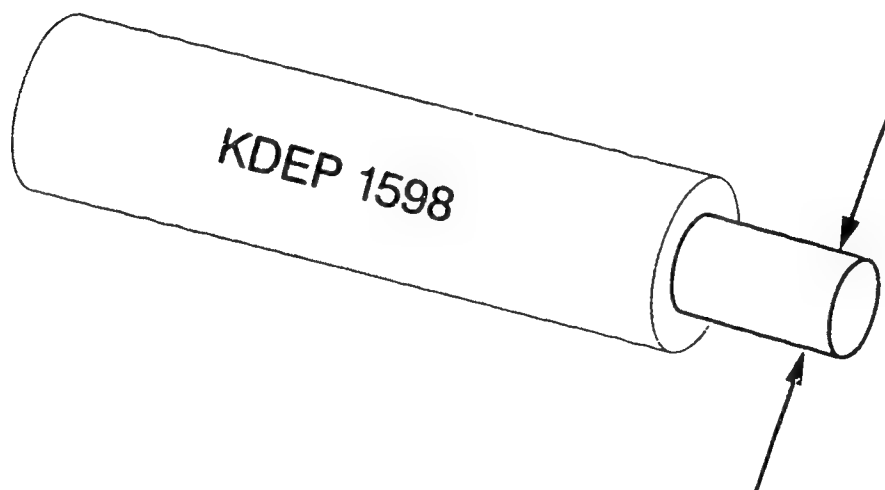
Modification

0381 En

Plug Insertion Tool

An increase in the wall thickness of cup plug 1 410 505 012, used for sealing the roller tappet lifting tool access bore, has necessitated a reduction in the diameter of insertion tool KDEP 1598. See illustration.

KMK04724





Reduce the diameter of the pilot pin by 0.4 to 0.5 mm to a diameter of 10.0 - 0.1 mm.

This will enable the tool to be more easily withdrawn from an inserted cup plug and will prevent the possible cracking of the pump housing during the cup plug insertion process. The modification of this tool will not affect its use on cup plugs made prior to the change.

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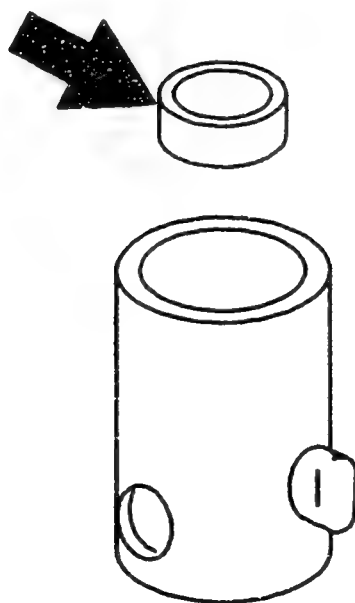
P-7100 (MACK)  
ROLLER TAPPET  
ASSEMBLY FAILURES

Workshop: EP  
12.1993  
0332 En

Combination Numbers:  
0 402 746 810 - 0 402 746 886

Manufacturing Dates:  
Up to 064 - Plant Code: 015  
Up to 072 - Plant Code: 927

If it becomes necessary to replace roller tappet assembly 2 418 750 022 because of a broken pressure plate (see illustration), you must replace all 6 with part number 2 418 750 041. After doing so, we remind you to check plunger LPC and phasing.



KMK02600

The exchange of the roller tappet assemblies is to be performed only in the event of breakage. Standard warranty terms apply.

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RQV-K FULCRUM LEVER  
ASSEMBLY INTERFERENCE

Workshop: EP  
12.1993  
0333 En

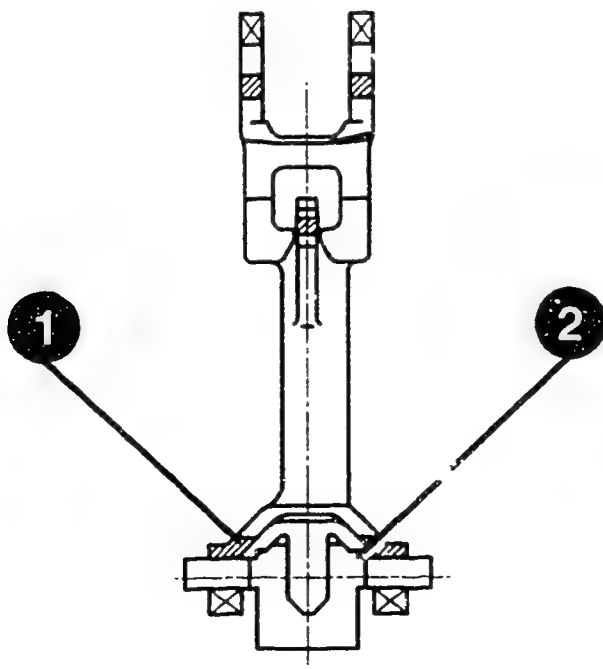
Manufacturing Date:  
Prior to 064 (April 1990)

If upon replacement of a fulcrum lever you encounter an interference with the sliding block as illustrated below, DO NOT MODIFY THE FULCRUM LEVER TO OBTAIN CLEARANCE. Replace the sliding block with part number 2 422 130 038.

- 1 = Do not alter to create space  
2 = Point of contact

Note:

When checking whether contact is made,  
it must be ensured that the parts are  
centered as illustrated.



KMK02601

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PES 6 M .RS 181  
0 400 076 956

Workshop: EP  
12.1993  
0383 En

Alteration to idle leaf spring  
FD 366/367

To improve load take-up and to avoid idle hunting the above-mentioned assembly features the new idle leaf spring (1.4 mm as opposed to 1.3 mm) as of FD 366. Assemblies with the new leaf spring are marked at the factory with a blue dot on cyl. 1 up to FD 367.

There is no blue dot as of FD 368.

This conversion alters the following settings:

Idle adjustment from:

n = 280 1/min 5.6...5.8 mm CRT  
to 5.1...5.3 mm CRT

Auxiliary idle spring from:

n = 400 1/min 4.3...4.5 mm CRT  
to 4.7...4.9 mm CRT

Idle delivery from:

n = 280 1/min 5.5...6.5 cm<sup>3</sup>/1000S  
to 8.0...9.0 cm<sup>3</sup>/1000S.



Following conversion, "X" is to be stamped on the rating plate of the injection pump after the assembly part number.

Corresponding test specification sheet is marked under customer ident no. with FD.

LA, OM 442 LA and OM 447hA.

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PE..P..S 7800  
with 2-stage LDA  
for Mercedes-Benz engines,  
series 400

Workshop: EP  
12.1993  
0385 En

Poor performance

Complaints are occasionally received concerning power problems or high fuel consumption with engines of the types listed below.

OM 402 LA, OM 442 A, OM 401 LA, OM 441 LA, OM 442 LA and OM 447hA.

The following procedure should be employed if satisfactory performance is still not obtained after the engine has been checked by a MERCEDES-BENZ service outlet:

With IP assembly removed, block spring retainer of 2nd stage of LDA by turning it three times.

Attention:

Following conversion, "X" is to be stamped on the rating plate of the injection pump after the assembly part number.

Test specifications and service parts lists for these converted IP assemblies (variants) will gradually be published on microcard WP.. or EP.. in line with the basic pump concept (see Service Info).

The IP assembly is always to be checked/set in accordance with the latest test specifications on microcard WP..

The values checked/set are always to be documented on the basis of the BOSCH test record.

It is to be noted that the values for LDA adjustment are only to be used for presetting the LDA.

Attention must be paid to the delivery profile values even if this means altering the previously set LDA values.

Precision pressure gauges are to be employed (e.g. ALDA tester 0 684 200 610 or standard pressure gauge 0...1.6 bar, class 0.6, scale divisions 0.05).

The conversion work does not affect the homologation for the vehicles concerned.

OM 402 LA

280 kW at 2100 1/min or 1900 1/min

The following IP assemblies are affected:

0 402 648 893, 0 402 648 894,  
0 402 648 895, 0 402 648 914 and  
0 402 648 915.

1. Block spring retainer of 2nd stage of LDA by giving it three turns.
2. Replace LDA spring of 1st stage with spring 2 424 619 088.
3. Check and if necessary adjust start of delivery to 9.0 Grad before OT.

IP assembly is to be removed for conversion.

OM 442 A

250 kW at 2100 1/min

The following IP assemblies are affected:

0 402 648 900 and 0 402 648 901.

1. Block spring retainer of 2nd stage of LDA by giving it three turns.
2. Replace LDA spring of 1st stage with spring 2 424 619 104.
3. Check and if necessary adjust start of delivery to 6.0 Grad before OT.

IP assembly is to be removed for conversion.

OM 442 A

250 kW at 1900 1/min

The following IP assemblies are affected:

0 402 648 900 and 0 402 648 910.

1. Block spring retainer of 2nd stage of LDA by giving it three turns.
2. Replace LDA spring of 1st stage with spring 2 424 619 104.
3. Check and if necessary adjust start of delivery to 6.0 Grad before OT.

IP assembly is to be removed for conversion.

OM 401 LA

230 kW at 1900 1/min

The following IP assemblies are affected:

0 402 646 917,      0 402 646 926,  
0 402 646 953 and 0 402 646 958.

1. Block spring retainer of 2nd stage of LDA by giving it three turns.
2. Check and if necessary adjust start of delivery to 9.0 Grad before OT.

IP assembly is to be removed for conversion.

OM 401 LA

230 kW at 2100 1/min

The following IP assemblies are affected:

0 402 646 929, 0 402 646 930,  
0 402 646 952, 0 402 646 957,

1. Block spring retainer of 2nd stage of LDA by giving it three turns.
2. Check and if necessary adjust start of delivery to 9.0 Grad before OT.

IP assembly is to be removed for conversion.

OM 401 LA

200 kW at 1900 1/min

The following IP assemblies are affected:

0 402 646 939 and 0 402 646 940.

1. Block spring retainer of 2nd stage of LDA by giving it three turns.
2. Check and if necessary adjust start of delivery to 9.0 Grad before OT.

IP assembly is to be removed for conversion.

OM 401 LA

200 kW at 2100 1/min

The following IP assemblies are affected:

0 402 646 915 and 0 402 646 916.

1. Block spring retainer of 2nd stage of LDA by giving it three turns.
2. Check and if necessary adjust start of delivery to 9.0 Grad before OT.

IP assembly is to be removed for conversion.

OM 441 LA

250 kW at 1900 1/min

The following IP assemblies are affected:

0 402 646 924, 0 402 646 925 and  
0 402 646 950

1. Block spring retainer of 2nd stage of LDA by giving it three turns.
2. Check and if necessary adjust start of delivery to 9.0 Grad before OT.

IP assembly is to be removed for conversion.

OM 401 LA

200 kW at 2100 1/min

The following IP assemblies are affected:

0 402 646 921, 0 402 646 931 and  
0 402 646 942

1. Block spring retainer of 2nd stage of LDA by giving it three turns.
2. Check and if necessary adjust start of delivery to 9.0 Grad before OT.

IP assembly is to be removed for conversion.

OM 442 LA

320 kW at 1900 1/min

The following IP assemblies are affected:

0 402 648 898 and 0 402 648 906.

1. Block spring retainer of 2nd stage of LDA by giving it three turns.
2. Check and if necessary adjust start of delivery to 9.0 Grad before OT.

IP assembly is to be removed for conversion.



OM 442 LA

232 kW at 2100 1/min

The following IP assemblies are affected:

0 402 648 908 and 0 402 648 918.

1. Block spring retainer of 2nd stage of LDA by giving it three turns.
2. Check and if necessary adjust start of delivery to 9.0 Grad before OT.

IP assembly is to be removed for conversion.

OM 447 hA

184 kW at 2100 1/min

The following IP assemblies are affected:

0 402 746 913, 0 402 746 916,  
0 402 746 919 and 0 402 746 923.

1. Replace LDA spring of 1st stage with spring 2 424 619 992.
2. Replace spring retainer of 2nd stage with threaded bush 2 420 365 003.
3. Check and if necessary adjust start of delivery to 6.0 Grad before OT.

IP assembly is to be removed for conversion.

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VE (DI) FUEL-  
INJECTION PUMPS

Motor vehicle: FZD  
and workshop : EP

12.1993

Shutoff problems

0393 En

Pumps affected

0 460 414 083

Ford

0 460 414 085

"

0 460 414 086

"

0 460 414 089

"

0 460 414 069

Landrover

0 460 414 080

"

0 460 414 093

"

If shutoff problems are encountered on a vehicle with a VE pump featuring this type number outside the warranty period, all the fuel-injection pumps concerned must in future be checked as follows by Bosch Service Stations:

In such cases, please check for signs of abnormal wear at cam plate or at rollers of roller ring.

If so,

1. renew cam plate and roller ring
2. send in damaged parts together with warranty and goodwill claim

This procedure is subject to the following restrictions:

1. Above-mentioned VE-pumps with stated type numbers only.
2. Dates of manufacture (FD) from 950 to 364 (10.89 - 4.93)
3. Mileage max. 100 000 km
4. Period of validity of this stipulation up to end of 1995

This complaint is to be indicated in the warranty and goodwill claim under warranty type "7" and defect number "68".

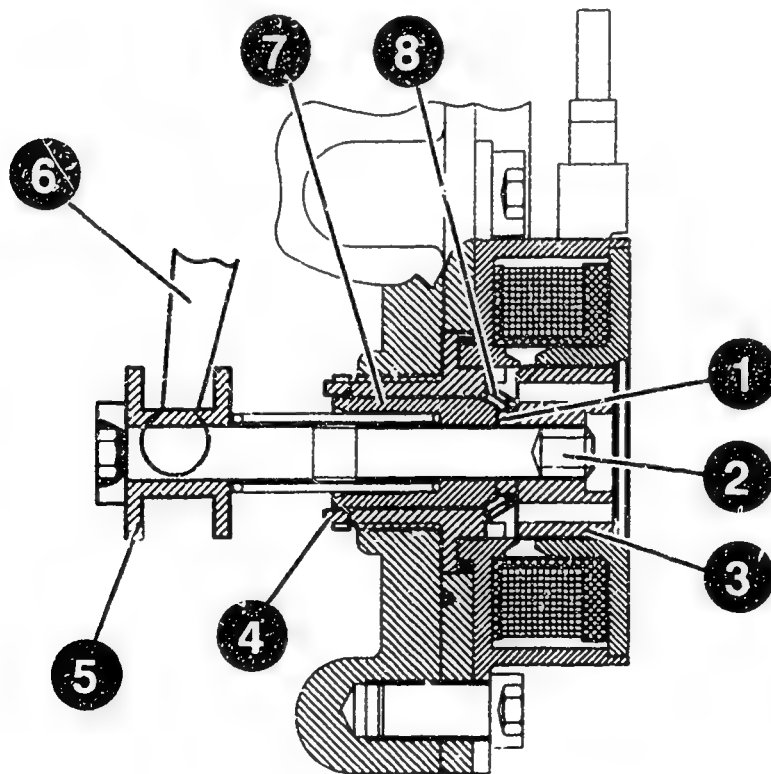
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Division KH  
Technical After-Sales Service  
(KH/VKD 2)

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## ARD COMPONENTS

- 1 = Shim, ARD stroke  
(brass)
- 2 = Full-load adjusting screw
- 3 = Armature
- 4 = Outer threaded sleeve
- 5 = Driver
- 6 = Fulcrum lever
- 7 = Guide sleeve (full-load screw)
- 8 = Return spring



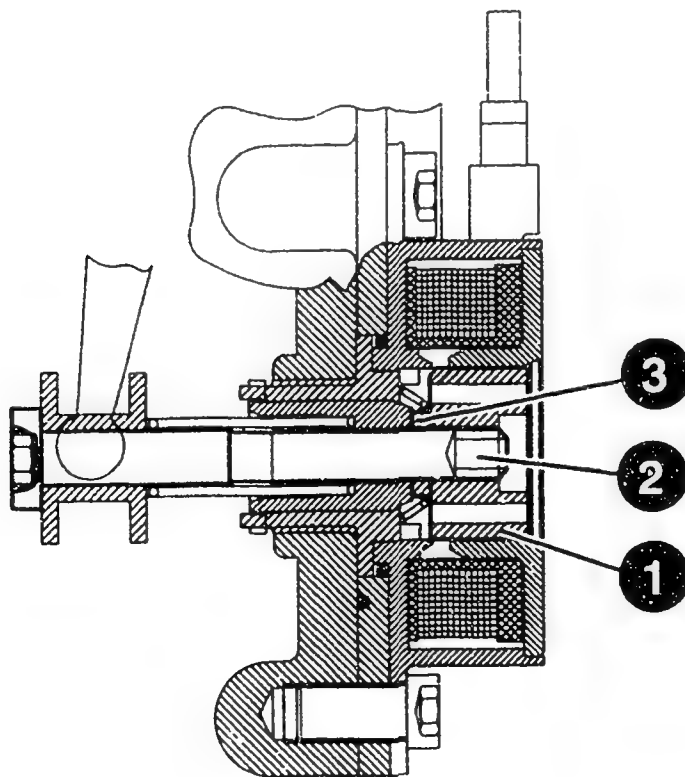
KMK04786

## REMOVING SHIM, ARD STROKE

- 1 = Armature
- 2 = Full-load screw
- 3 = Shim, ARD stroke

Remove ARD fastening screws.  
Loosen armature with socket wrench  
KDEP 1911 - 0 986 612 599.  
Whilst doing so, conterhold full-load  
screw with 3 mm Allen wrench.  
Remove return spring.  
Remove shim, ARD stroke.  
Replace shim removed (thickness of  
shim 2.55 mm instead of 3.15 mm).

KMK04787



## ARD ASSEMBLY

4 = Return spring

5 = Guide sleeve

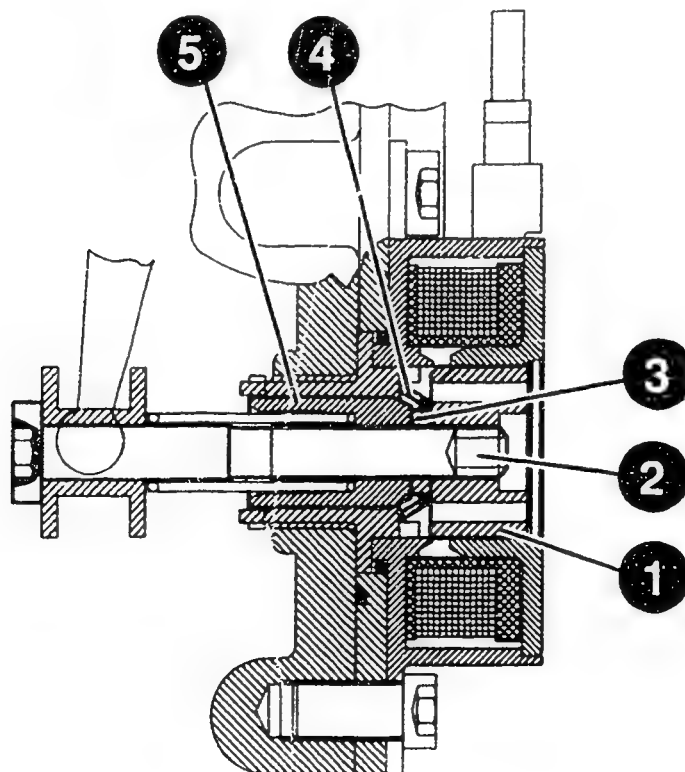
Insert return spring in correct position. Screw armature by hand on to full-load screw.

Insert socket wrench 0 986 612 599 in holes in armature and tighten to 5...7 Nm.

Counterhold full-load adjusting screw whilst doing so.

Following armature assembly, locating lug of guide sleeve must engage in recess in outer threaded sleeve.

The costs of conversion are to be billed.



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PE(S)..P..S 8000 and  
PE(S)..P..S 8500

Workshop: EP  
03.1994  
0394 En

## MODIFICATION OF ASSEMBLY SEAL

Re: In-line pumps with cross-scavenging

With the above-mentioned in-line pumps the assembly seal is provided by a support-ring/O-ring/support-ring configuration.

The new assembly seal was introduced on in-line pumps with cross-scavenging on account of the greater seal loading.

The slotted support rings used to date are being replaced in the course of the current series by solid support rings.

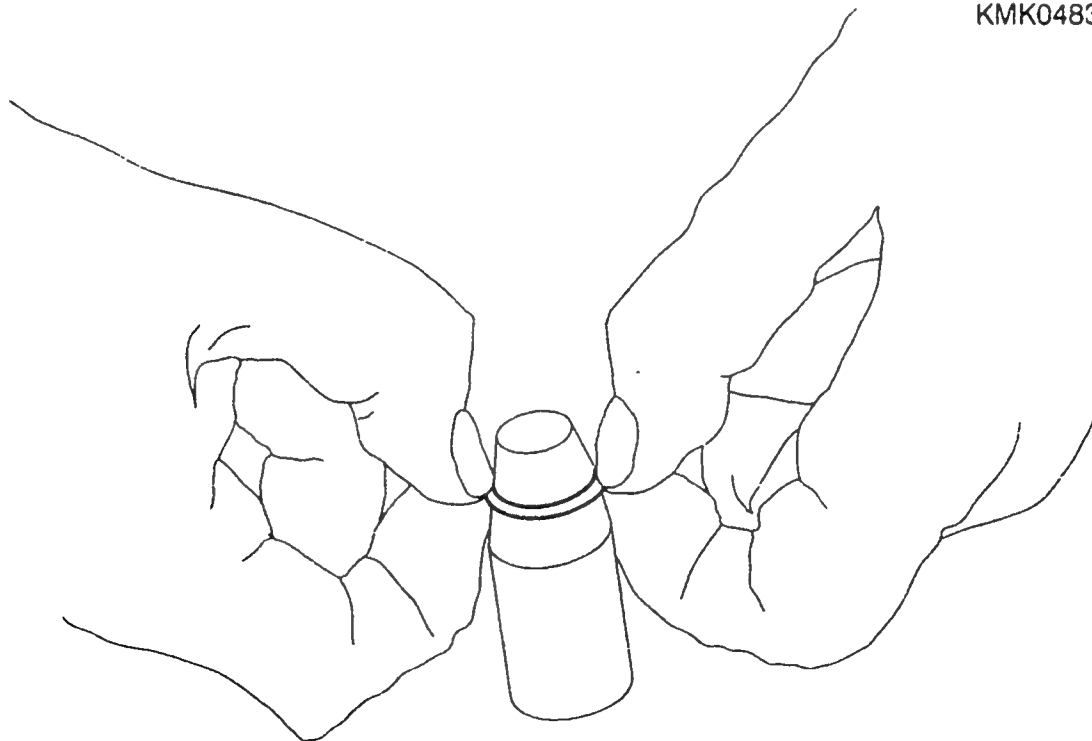
As a result of this modification, the support rings must be fitted with extreme care. Attention must be paid to the procedure outlined in the following.

Place the inner part of the assembly device 0 986 612 495 on a firm base. Hold support ring firmly between thumb and index finger of both hands and slowly slip over taper onto cylindrical section of inner part (picture).

During the slip-on process the support ring adapts to the size of the assembly device. If the support ring is pushed on too quickly, there is a danger of it collapsing.

If this happens, permanent deformation will result and the ring must be scrapped.

KMK04839

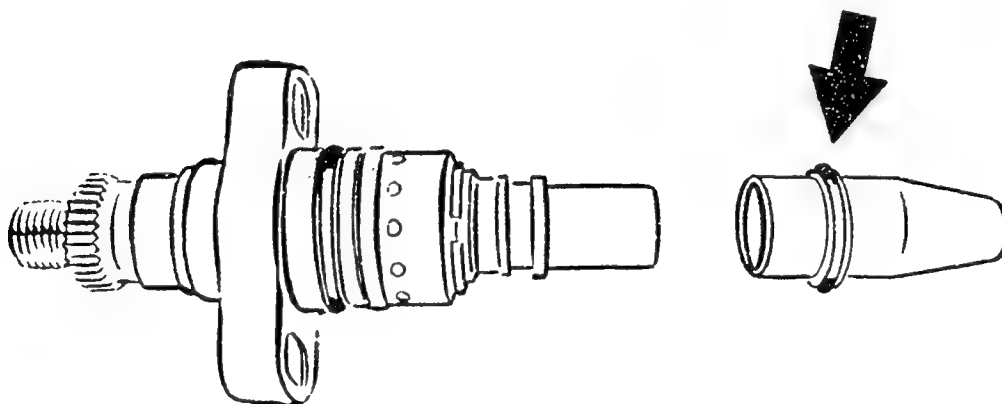


Slip O-ring over inner part such that it makes contact with support ring already fitted.

Install second support ring accordingly.

Slide inner part with support ring/O-ring/support ring (arrow) over assembly as far as they will go.

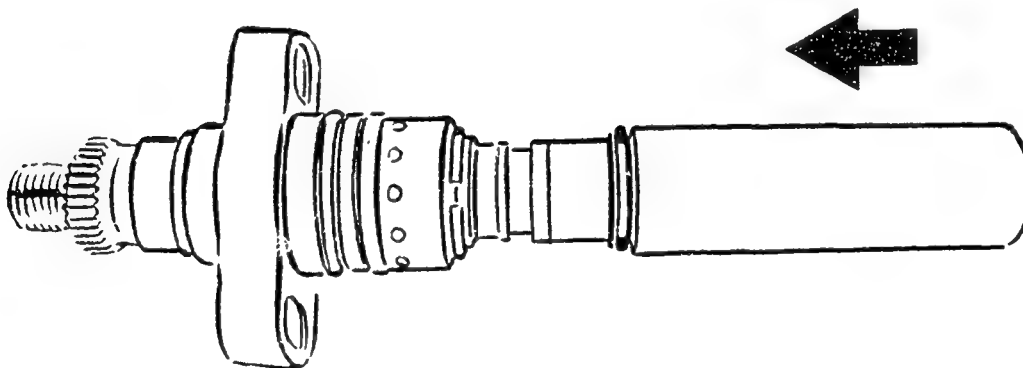
KMK 03652



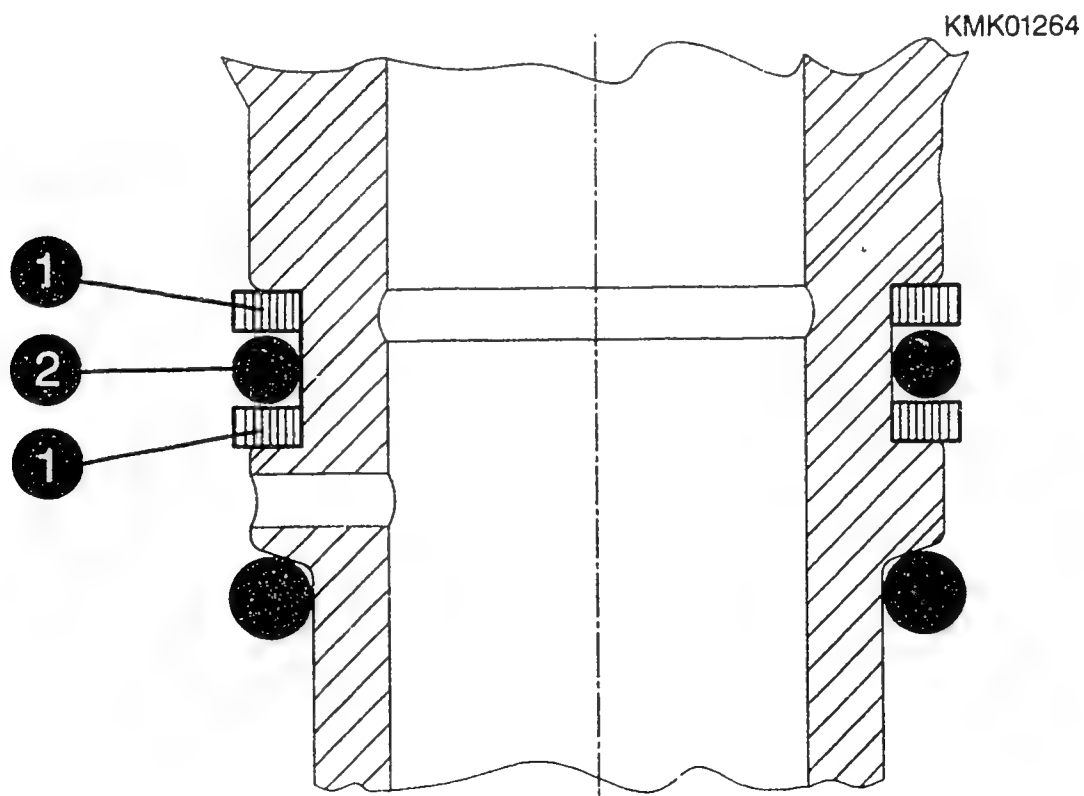
Slip support ring/O-ring/support ring  
with outer part of assembly device  
0 986 612 495 onto assembly (picture).

In doing so, make sure support ring  
does not collapse.

KMK 03653



Check whether support ring (1)/  
O-ring (2)/support ring (1) are  
correctly positioned as shown.



Note:

- \* When performing repairs, support rings and O-rings already fitted are to be replaced with new ones.
- \* Support rings which collapsed on assembly are to be replaced with new ones.
- \* Pump housings and plunger-and-barrel assemblies of old (slotted support ring) and new (solid support ring) versions are identical. Slotted support ring can therefore simply be replaced by solid type.

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PE(S)...P... WITH  
EDC POSITIONER RE...

008.93 En  
03.1994

### Adjustment instructions

A detailed and full description of all test and adjustment procedures for EDC fuel-injection equipment PE(S)...P... with positioner RE... can be found on microcard VDT-W 400/019.

We would stress that the specifications given there for the DC voltmeter must be observed.

### Voltmeter:

The microcard VDT-W 400/019 outlines the requirements in terms of basic DC accuracy in the list of testers, tools and devices for the voltmeter (digital multimeter):

- Deviation less than 0.1 % from reading.
- Resolution 0.001 V in measuring range up to approx. 4 V.

Compliance with these requirements is absolutely essential.

## Voltmeter:

Our investigations into various events in recent times have shown that use has been made of measuring instruments with insufficient accuracy.

This results in considerable overshooting of the IP adjustment tolerances and thus leads to complaints about performance, engine power and consumption.

In worst-case situations the engine will not start. The stated accuracy requirements are satisfied, for example, by the multimeter "Fluke 87". The Bosch multimeter MMD 301 (0 684 500 301) is not capable of such accuracy and is therefore unsuitable.

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PE (S) P-8500

Workshop: EP

03.1994

P-8500 Test Equipment  
Requirements

0398 En

By the end of October, 1993 various Mack E7 engines will be equipped with a new Bosch model P-8500 fuel injection pump capable of delivering the higher injection pressures needed to meet 1994 emissions.

These upcoming versions (0 402 996 301 and ... 302) require greater drive torque than does the P-7100 injection pump.

At 900 RPM test benches must deliver a minimum of 7.5 kW with a minimum 0.5 kgm<sup>2</sup> flywheel inertia and the drive coupling must have a minimum 3000 Nm/degrees torsional rigidity. Please make sure that your test equipment meets these requirements before servicing the P-8500.

NOTICE:

FOR SAFETY REASONS, BOSCH REQUIRES THE INSTALLATION AND USE OF A NEW, JAWLESS DESIGN DRIVE COUPLING ON BOSCH TEST BENCHES THAT WITHSTANDS THE ABOVE DRIVE TORQUE CRITERIA WHEN TESTING P-8500 INJECTION PUMPS. FAILURE TO USE A COUPLING WHICH MEETS THE STANDARDS SET FORTH ABOVE MAY RESULT IN THE DESTRUCTION OF THE COUPLING AND THE PROTECTIVE SHIELD ON THE TEST BENCH. PLEASE NOTIFY ALL SHOP PERSONNEL PROMPTLY.

Bosch has available a coupling for Bosch test benches sufficient to test the P-8500 pump. Please update your Bosch test bench with these components in preparation for testing the P-8500.

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PE(S) MW...  
NAVISTAR APPLICATIONS

Workshop: EP  
03.1994  
0399 En

Sticking Plungers  
P/N 1 418 415 093

Navistar has been experiencing sticking MW-pump plungers on some truck applications. The complaints have all been that the vehicle won't start following shut-down. Average miles to failure is 17.300 although failures have occurred with as many as 77.000 miles on a vehicle.

Failures have been limited to MW-pump manufacturing date codes (MDC) 950-062. The cause of failure is related to a heat treat process problem.

Pump numbers affected:

0 403 446 227  
0 403 446 228  
0 403 446 229

If you receive a pump for warranty repair with a tight plunger, the plunger is NOT scored, is of MDC 950-062 and is one of the pump numbers listed above, we recommend that all six elements be replaced. This will be covered under Bosch warranty. Standard warranty therms apply.

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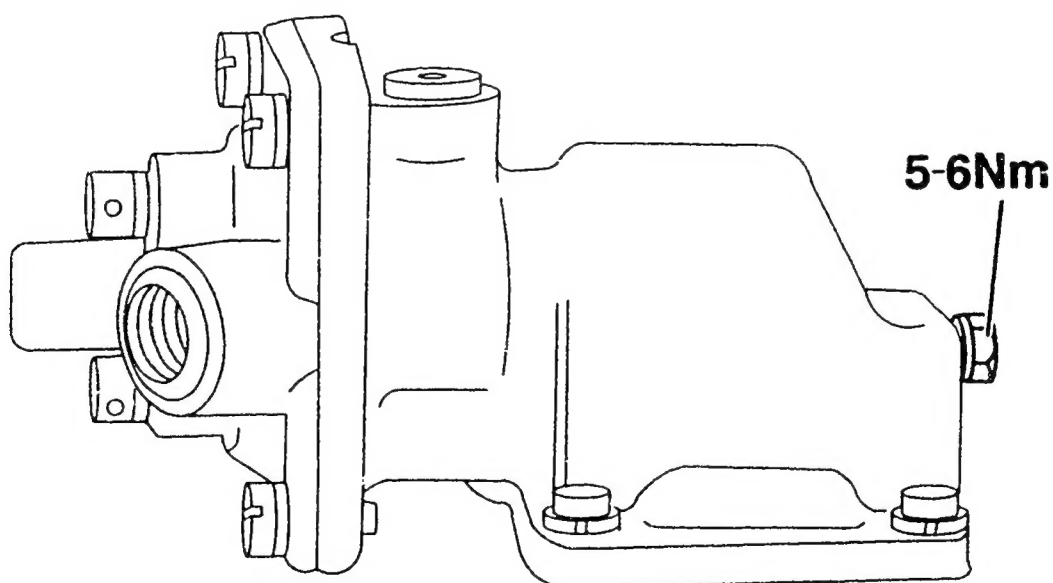
P-7100 0 402 746...  
WITH RQV-K LDA

Workshop: EP  
03.1994  
0400 En

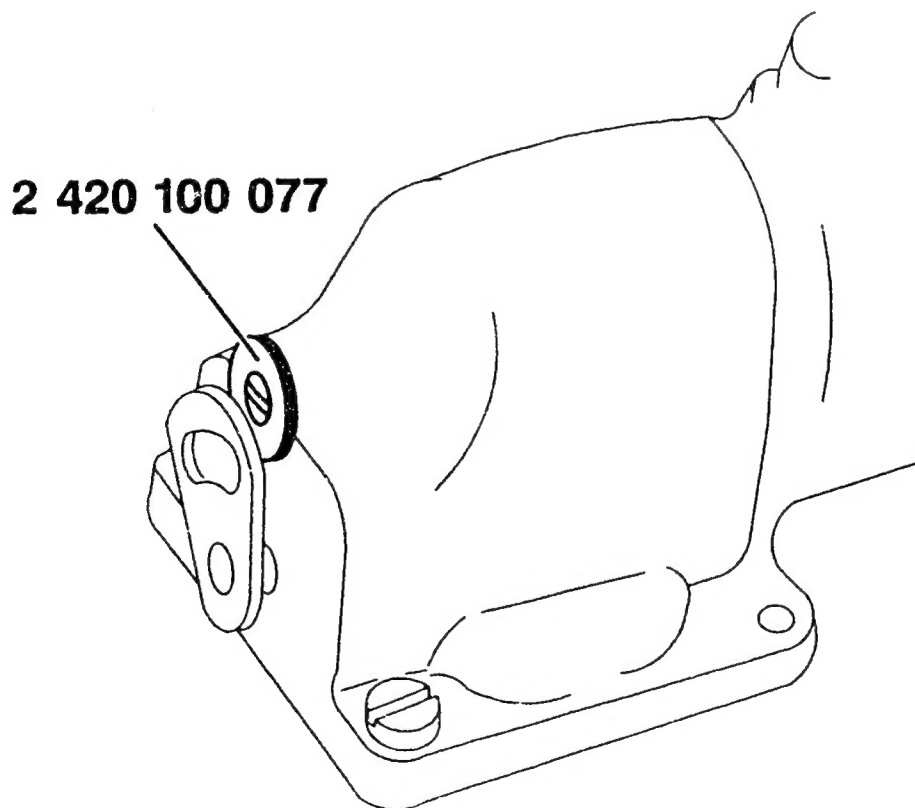
### Adjustments

When performing starting fuel quantity adjustments on P-7100 injection pump combinations using top-mounted LDA assemblies, be certain to apply the correct torque to the locking screw and ensure that there is full movement capacity of the stop part after doing so. The specified torque of the locking screw is 5...6 Nm (see illustration).

KMK04725



In the event that the stop part does not slide on the eccentric shaft when the setting screw is tightened, install a 0.5mm shim part number 2 420 100 077 between the adjusting quadrant of the shaft and the housing. Pass the screw threads through the center hole in the shim (see illustration).



KMK04726

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